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MARKET PENETRATION OF ALBERTA AND SASKATCHEWAN PORK PRODUCTS INTO THE PACIFIC REGION OF THE UNITED STATES

by

©

LYLE DALE SMITH

A THESIS
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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read and recommend to the Faculty of Graduate Studies for acceptance a thesis entitled "Market Penetration of Alberta and Saskatchewan Pork Products into the Pacific Region of the United States," submitted by Lyle D. Smith in partial fulfilment of the requirements for the degree of Master of Science.

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ABSTRACT

The potential for Canadian pork exports to the Pacific region of the United States combined with market penetration difficulties were analyzed in this study.

The Prairie Provinces have the productive resources to produce a total of eight million hogs per year. Excess capacity in the meat packing industry is sufficient to support this production.

More than 50 percent of Canada's pork exports are to the United States, accounting for approximately 16 percent of U.S. pork imports. Canada's exports of fresh and frozen pork have increased, while the relative share of pork exports in the processed form continues to decline.

The Pacific region of the United States does not have the productive resources to satisfy consumer demand for red meat. The region's population exceeds Canada's by 5 million people. The average consumer's income exceeds the average Canadian's income. Assuming that per capita pork consumption in the Pacific region will equal the U.S. average by 1980, total pork consumption would increase 426 million pounds.

Market variables influencing pork exports from Alberta and Saskatchewan into the Pacific region were tested using multi-variable linear analysis and ordinary least squares. The model was supplemented with personal interviews with members of the meat industry in the Pacific region. Interviews considered the exchange, physical, and facilitating marketing processes. The concept of forward contracting a stable supply was also investigated.

Significant market variables influencing Canada's pork exports into the study area were farm and wholesale price spreads between Canada and the United States, and pork stocks in Alberta and Saskatchewan. Based on the interviews, it was concluded that bacon, sausage, and salami manufacturers and firms purchasing portion control cuts would forward contract their supplies under several contractual agreements. Continuity of supply is the major trade impediment.

The Prairie Provinces can provide product delivery comparable to the Mid-Western States, and have the productive resources to fulfill the market potential of an additional 426 million pounds of pork. However, U.S.D.A. meat inspection at point of lading, improved financial arrangements with meat purchasers in the Pacific region, and forward supply commitments will be necessary if Canadian suppliers wish to participate in this market opportunity.

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During my graduate career, I have encountered a countless number of people who in one form or another have influenced the final outcome of this thesis.

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CHAPTER I

INTRODUCTION

Necessity of the Study

Agricultural producers in the grain sector utilize various marketing channels and/or diversify into livestock production for grain disposal. Direct grain sales to the Canadian Wheat Board under regulated quota is the first alternative. Grain producers facing inventory accumulations and cash shortages can also supplement their income by selling feedgrain in excess of quota grain to local or regional feedmills and/or livestock producers. Other grain producers diversify into livestock enterprises, thus providing an outlet for their grain inventories. Of the 366,128 Canadian farms recorded in the 1971 Census of Agriculture, over two-thirds reported having cattle, one-third reported hogs, and one-twentieth reported sheep.[1] Alberta statistics demonstrate a similar distribution. Of the 62,702 farms recorded in 1971, 44,575 reported having cattle, 26,204 reported hogs, and 2,511 reported sheep.[2]

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[1] V.W.Yorgason, Canada's Livestock-Meat System (Ottawa: Agricultural Economics Research Council of Canada, 1973).

[2] Statistics Canada, Number and Areas of Census Farms , Cat.No.96-727, Census of Agriculture (Ottawa: Statistics Canada, 1971).

A grain producer realizes that a livestock enterprise may complement his grain production. His labor is utilized more efficiently throughout the year by diversifying into feeder or breeding stock. Further, the income risk caused by price fluctuations in the grain sector is reduced. Regular livestock marketings reduce yearly oscillation in a grain producer's cash flow and provide a major contribution to his annual income. Of the $5.38 billion total farm cash receipts for Canada in 1972, 57.14 percent were derived from the sale of livestock or livestock products.[1] A producer's objective of income growth through enterprise diversification supplements the government's goal of full employment by supplying the raw materials for abbatoir and meat packing operations. In 1971, 460 slaughtering and meat packing plants paid $248.56 million in wages and salaries to 31,332 employees and sold $2.1 billion worth of product.[2] These figures represent a reasonable rate of growth within the industry over the last decade. The figures in 1961 indicate that 242 slaughtering and meat packing plants paid $112.92 million in wages and salaries to 25,075 employees.[3]

In 1971 the Province of Alberta ranked third in the number of abbatoir and meat packing plants, paying their 5,086 employees $41.17 million in wages and selling $479 million worth of product. Alberta's agricultural producers received $445.05 million from livestock sales, 57.29 percent of total farm cash receipts for the same period. Of total farm cash receipts in 1971, 10.85 percent or $84.33 million was generated from the sale of hogs.[1]

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[1] Statistics Canada, Farm Cash Receipts , Cat.No.21-001 (Ottawa: Statistics Canada, December, 1972).

[2] Statistics Canada, Slaughtering and Meat Processors , Cat.No.32-221 (Ottawa: Statistics Canada, 1971).

[3] Ibid., 1961, p.10.

A growth in farm income can be accomplished by increasing output at constant prices, by stabilizing output at improved prices, or by increasing output at higher prices. Unfortunately, cyclical and seasonal price variations in the hog industry are well known phenomena resulting from variations in the demand and supply of pork. Cyclical and seasonal pork supply arise from alternative resource allocations by farmers who shift their production patterns into enterprises which yield the greatest returns to available management, labor, and capital. Consequently, when hog prices are high and/or feedgrain prices low, with alternative grain use unattractive, production facilities are shifted into hog production, weakening farm prices in the next period. However, if pork production expands proportionately with demand, farm prices are maintained and the total revenue received by hog producers will increase in an expanding industry.[1]

---

[1] Statistics Canada, Farm Cash Receipts , Cat.No.21-001 (Ottawa: Statistics Canada, December, 1971).

A nation's population and per capita personal income are the major demand factors, ceteris paribus , influencing pork consumption. Canada's personal disposable income has grown substantially over the last decade, while her population has shown moderate growth rates.[2] Holmes found that Canada's income elasticity of demand for pork was 0.10 in 1964, meaning that a 10 percent increase in per capita personal income results in a 1 percent increase in pork consumption.[3] The low income elasticity of demand for pork and the moderate population growth rate in Canada indicate that domestic pork prices will fall when hog production accelerates, unless export markets are developed.

The demand for pork by Canadian consumers is insufficient to support a surge in Canada's hog production. Therefore, with an increase in hog production, a producer's hog price is maintained by expanding and developing export markets. Population, disposable income, and geographic location are three criteria that marketing agencies evaluate when developing an export market for a commodity. The Pacific region of the United States is a market area that justifies exploratory research.[1] Its population is larger than Canada's by 5 million people. The average consumer's personal disposable income in the Pacific region also exceeds the disposable income of the average Canadian. At the same time, the cost of transporting pork products to the Pacific region from Alberta and Saskatchewan is competitive with transportation costs of suppliers from alternative markets. However, consumer tastes and preferences, meat wholesale and retail requirements, the meat processing industry's desires, and trade flow impediments should be thoroughly understood before a continuing viable pork flow from Alberta and Saskatchewan to the Pacific region is developed.

---

[1] A necessary condition for this assumption to be true is that the supply and demand elasticities for pork are identical.

[2] Canada's per capita personal income increased from $1,266 in 1962 to $3,747 in 1972. Canada's population increased from 18.2 million to 21.9 million during the same period.

[3] R.A. Holmes, Estimation of Demand Elasticities for Substitute Foods , Publication No.3 (Ottawa: Agricultural Economics Research Council of Canada, 1966).

Objectives of the Study

1. To analyse the criteria which affect a meat processor's decision when purchasing pork products from alternative markets.
2. To analyse the basis for the flow of pork products into the Pacific Northwestern States.
3. To analyse possible weaknesses in marketing

---

[1] The term 'Pacific region' used throughout this study refers to the states of California, Idaho, Oregon, and Washington.

functions that depress Alberta's pork trade with the Pacific region.

4. To analyse the extent to which additional pork processing could be undertaken in order to expand Alberta's pork exports.

Hypotheses

The market conditions influencing the supply and demand for pork products lead to the formulation of the following hypotheses:

(1) The farm price spread for hogs between Canada and the United States influences the flow of Canadian pork products into the Pacific region of the United States.

(2) The price spread for pork cuts between alternative markets is a major factor influencing the purchasing behavior of meat processors in the Pacific region.

(3) Hog slaughter in Alberta and Saskatchewan directly influences the flow of pork products into the Pacific region.

(4) Hog slaughter in the United States inversely alters the flow of Alberta and Saskatchewan pork products into the Pacific region.

(5) The flow of pork products from Alberta and Saskatchewan into California is directly related to retail pork prices in California.

(6) Pork stocks in Alberta and Saskatchewan directly

influence the flow of pork products from Alberta and Saskatchewan into the Pacific region of the United States.

Research Procedure

The research conducted in this study occurred in various phases. The first phase concentrated on familiarizing the author with hog marketing, slaughtering, and processing procedures in Western Canada. The Alberta Hog Producers' Marketing Board and packing plants in Alberta and Saskatchewan, where hog slaughtering, carcass breaking, and meat processing techniques were observed and documented, provided the necessary information.

Phase two involved documenting the physical distribution of pork products from Alberta into the San Francisco-Oakland Bay region. The loading of trucks, border clearance at Coutts, United States Department of Agriculture meat inspection at Great Falls, and product deliveries to purchasers in Oakland were observed by the author.[1]

A questionnaire concentrating on functions of marketing was developed.[2] It served as a working base for unstructured personal interviews conducted with industry people in the San Francisco-Oakland Bay region, in Sacremanto, Los Angeles, Spokane, Portland, and Seattle.[1]

---

[1] The author rode with a truck courier, transporting meat from Edmonton to San Francisco and recorded meat handling procedures and time intervals.

[2] For an explanation of the ten functions of marketing, see: R.L. Kohls and W.D. Downy, Marketing of Agricultural Products (New York: MacMillan Company, 1972).

In California the interviews were undertaken by two teams composed of three people each. Two and three man teams completed the remainder of the interviews in Idaho, Oregon, and Washington.[2] After an interview was completed, each team discussed and recorded the respondent's answers.

An econometric model containing three equations was developed to explain the flow of pork products from Alberta and Saskatchewan into the Pacific region. The weekly data utilized in the study were collected by the author from primary and secondary sources. Weekly production data and hog prices for 1973 were obtained from information recorded in Canada Livestock and Meat Trade Report , Canada Department of Agriculture and Livestock, Meat, Wool , United States Department of Agriculture. Weekly trade in pork products was obtained from confidential industry sources, and 1973 data for the retail price of bacon were acquired from monthly reports of the United States Department of

---

[1] Meat brokers and processors, packing plants, wholesalers, and retailers were interviewed. Names were obtained from industry members and through suggestions made by federal and provincial Departments of Industry, Trade and Commerce located in San Francisco, Los Angeles, and Seattle.

[2] Industry, government, and university people who participated as team members are included in Appendix A.

Labor. Weekly pork stocks for 1973 were estimated from monthly information recorded in Stocks of Frozen Meat Products , Statistics Canada. Weekly pork stocks were assumed to vary directly with weekly hog gradings for an increase in monthly stocks. Otherwise, an inverse relationship between weekly hog gradings and stocks was assumed.

Weaknesses of the Study

The methodology incorporated in exploratory research constrains the analysis a researcher can perform. In exploratory research, the analysis is determined by whether parametric or non-parametric data are available, Parametric data can be subjected to a t-test and F-test, whereas data which are non-scalar cannot. Questionnaire responses obtained from the unstructured personal interviews in this study presented non-parametric data. This datas' validity cannot be statistically tested. However, valid statistical tests are possible on responses to a written questionnaire if the research design presents scaled data. Consequently, the unstructured personal interview schedule could have been supplemented with a written questionnaire for isolating specific marketing problems.

The methodology of a research project utilizing an econometric model requires the acquisition of primary and/or secondary information that can be quantified in time series or cross-sectional form. Regression analysis is then used to measure the effect of the explanatory variables on the dependent variable.

The basic weaknesses of any study that utilizes an econometric model is the difficulty inherent in acquiring accurate and reliable data. Industry members interested in expanding their business activities in the Pacific region were very cooperative. At the same time, the cooperation of other industry members in providing additional information would have increased the validity of the econometric model.

The time period over which observations were collected creates another possible error. During 1973, world currencies were adjusted, thus altering the comparative advantage of countries which participate in international trade. President Nixon's unexpected announcement of a price freeze on domestic prices created further uncertainty and possible shifts in firms' trading patterns. A structural change influencing Canada's traditional meat trading patterns has occurred with the active participation of Japanese traders. Alberta's forward contracting scheme for hogs presented another structural change in 1973. A Canadian rail strike restricting rail movements of perishable goods from July 26, 1973 until August 23, 1973 may have influenced traditional methods of distributing meat products.

Organizational Outline

The Prairie hog industry is described in Chapter II. It includes the production base for hogs, the meat packing industry and plant utilization, hog processing, and pork product distribution channels. Chapter III gives a description of Canada's pork trade with the United States, concentrating on pork exports from Alberta and Saskatchewan into the Pacific region. The study area is discussed in Chapter IV and includes a description of population, disposable income, consumption patterns, local hog supplies, and pork imports, as well as an indication of future potential. Chapter V specifies the econometric models. It develops the theoretical framework for the models, the analytical procedure, and the crucial assumptions for the analysis. The development of empirical models and econometric interpretation of the results, a priori , complete the chapter. The empirical results are recorded in Chapter VI. The chapter includes a statistical verification of the level of confidence that can be placed in the parameter estimates, the economic interpretation of the sign of the parameter estimates, and hypotheses testing. The responses of the personal interview schedules with meat industry representatives in the Pacific region are reported in Chapter VII. Industry responses (separated into Northern

California, Southern California, and Idaho; Oregon and Washington) concentrate on the exchange, physical, and facilitating marketing processes. Chapter VIII contains a summary and the conclusions reached by the study.

CHAPTER II

THE PRAIRIE HOG INDUSTRY IN ITS NORTH AMERICAN CONTEXT

Production Base for Alberta and Saskatchewan

Hog production in Eastern and Western Canada expanded at a fairly equal rate from 1951 to 1968, in spite of intervening fluctuations. Of the total commercial hog slaughter in 1968, 38 percent were slaughtered in the West, identical to the 1951 figure.[1] Since 1968, Western Canada has captured a larger share of commercial hog slaughter, contributing 45 percent in 1973.

Inspected hog slaughter in Canada has fluctuated between 5.84 million hogs and 9.74 million hogs annually since 1959 (Table 2.1). Based on 1973 data, Ontario, Quebec, and Alberta are the leading hog producing provinces. Their respective hog gradings were 2.56, 1.82, and 1.76 million hogs. Manitoba ranked fourth, with a 1973 slaughter of 1.23 million hogs.[2]

Larger hog units have developed since 1951. However,

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[1] M.L. Lerohl, G.A. MacEachern, and H. Vandermeulen, The Benefits and Burdens of Feedgrain Transportation Policy (Ottawa: Agricultural Economics Research Council of Canada, February, 1970), p.15.

[2] Agriculture Canada, Canada Livestock and Meat Trade Report (Ottawa: C.D.A., January 3, 1974).

TABLE 2.1

INSPECTED HOG SLAUGHTER IN WESTERN CANADA, EASTERN CANADA, AND CANADA, 1959 TO 1973

Year	Western Canada[1]	Eastern Canada	Canada
	.... million head	....	
1959	3.84	4.18	8.02
1960	2.85	3.33	6.18
1961	2.74	3.10	5.84
1962	2.65	3.38	6.03
1963	2.16	3.74	5.90
1964	2.65	3.97	6.62
1965	2.72	3.70	6.42
1966	2.42	3.70	6.12
1967	2.94	4.39	7.33
1968	3.06	3.36	7.42
1969	2.76	4.21	6.97
1970	3.58	4.70	8.28
1971	4.63	5.11	9.74
1972	4.21	5.14	9.35
1973	4.72	4.00	8.72

---

[1] British Columbia, Alberta, Saskatchewan, and Manitoba.

Source: Agriculture Canada, Livestock Market Review (Ottawa: CDA, annual, various issues).

Eastern hog producers have shown the largest shift into intensive hog production. The average number of hogs per farm was twenty-four for both Eastern and Western Canada in 1961. By 1966, the average had risen to forty-one and twenty-nine in Eastern and Western Canada, respectively.[1] In 1971 the number of hogs per herd increased further to eighty-eight in Eastern Canada and seventy in Western Canada.[2]

Assuming that the per capita pork consumption in Eastern Canada and Western Canada are identical, Canada's pork surplus and deficit regions can be identified. The Prairie Provinces contain 16.1 percent (26.8 percent, if British Columbia is included) of Canada's population.[3] More than 40 percent of Canada's hogs are slaughtered in Western Canada, indicating that the per capita pork supply in Western Canada exceeds the national average. Therefore, Western Canada is a pork surplus region.[4] On the other hand, the demand of Canadian consumers in Eastern Canada is filled by regional and foreign pork imports.

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[1] D.W. Sword "Location and Size of Hog Enterprises," Canadian Farm Economics , Vol.2, No.4 (October, 1967), pp.6-7.

[2] Statistics Canada, Agriculture Livestock and Poultry on Census-Farms , Cat.No.96-719 (Ottawa: Statistics Canada, August, 1972).

[3] Statistics Canada, Canadian Statistical Review , Vol.49, No.4, Cat.No.11-003 (Ottawa: D.B.S., April, 1974).

[4] Regional surplus is defined as that quantity of a commodity transferred from one region to another until a supplier's price margin from each market is identical after transfer costs.

Over the last decade, a pork surplus of between 130 million and 396 million pounds has been produced in the Prairie region (Table 2.2). Alberta has dominated the region in hog production. Since 1961 Alberta has maintained a pork surplus position of between 102 million pounds and 156 million pounds. Pork surplus in Saskatchewan has ranged between 286,000 and 101.9 million pounds.

Manitoba's pork surplus has averaged 112 million pounds since 1970. Manitoba hog marketing arrangements differ somewhat from the other Prairie Provinces. Furthermore, information on pork inshipments from Manitoba is not available. Consequently, Manitoba's pork industry will be excluded from the remainder of this study.[1]

Hog Production Potential In Western Canada

Hog production is directly related to feedgrain stocks. Kerr found that for each 1,000 tons of feedgrain in storage on Alberta farms an additional 205 hogs were marketed in Alberta. For Saskatchewan, the coefficient of the parameter estimate measuring the influence of feedgrain on hog

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[1] See: L.R. Rigaux, "Potential Markets for Manitoba's Livestock Production and Implications for the Economy," University of Manitoba, Winnipeg, study still in progress (unpublished).

TABLE 2.2

ESTIMATED PORK SURPLUS IN ALBERTA, SASKATCHEWAN, AND MANITOBA, 1961 TO 1973

Year	Alberta	Saskatchewan	Manitoba	Total
	.... '000 lbs			
1961	146,142	28,745	50,844	225,731
1962	145,540	19,000	40,243	204,784
1963	102,946	286	27,049	130,281
1964	124,626	16,178	45,942	186,746
1965	137,949	18,599	47,188	203,736
1966	105,081	15,185	46,013	166,279
1967	121,446	25,657	63,528	210,631
1968	135,524	25,470	62,028	223,022
1969	103,105	7,950	63,406	174,461
1970	121,970	60,438	103,432	285,840
1971	156,270	101,904	138,313	396,487
1972	146,138	87,869	102,684	336,691
1973	134,238	72,139	103,932	310,309

Source: See Appendix B for detailed calculations for each province.

production was statistically significant; but hog production response was minute.[1]

The Prairie Provinces are the main source of Canadian feedgrain production. In Canada in 1968, 97 percent of wheat production, 69 percent of oat production, and 92 percent of barley production was produced on the Prairies.[2] Information from the Western Soil Survey and on A.R.D.A. land capability study indicates that approximately 100 million acres are suitable for cultivation. Approximately 64 million acres were under cultivation in 1967, allowing for a 60 percent acreage expansion in the future. Although no cost estimate was completed for bringing the additional 36 million acres into cultivation, it is projected that a tripling of grain production is possible within the next twenty years, if known technology complements acreage expansion.[3]

In the Prairie region, feedgrain acreage has declined since 1967 (Table 2.3), while hog slaughter has increased from 3.0 million hogs in 1967 to 3.9 million in 1973. An increase in feedgrain production can occur through the use

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[1] T.C. Kerr, Determinants of Regional Livestock Supply in Canada , Publication No.15 (Ottawa: AERCC, 1969).

[2] M.L. Lerohl, G.A. MacEachern, and H. Vandermeulen, op. cit., p.87.

[3] A.E. Hannah, "Production Possibilities for Grain in Western Canada," Canadian Journal of Agricultural Economics , Vol.16, No.1 (1968), pp.71-76.

TABLE 2.3

ACREAGE AND PRODUCTION OF WHEAT, OATS, AND BARLEY, PRAIRIE PROVINCES, 1965 TO 1971

Year	Wheat	Oats	Barley	Total
Acreage		'000 acres		
1965-66	27,790	5,645	5,741	39,176
1966-67	29,166	5,450	7,010	41,626
1967-68	29,570	5,090	7,600	42,260
1968-69	28,860	5,340	8,330	42,530
1969-70	24,400	5,630	9,000	39,030
1970-71	12,000	5,260	9,500	26,760
1971-72	18,885	5,315	13,312	37,512
Production		million bushels		
1965-66	632	272	202	1,106
1966-67	807	258	283	1,348
1967-68	574	195	230	999
1968-69	629	249	301	1,179
1969-70	665	278	355	1,298
1970-71	312	280	391	983
1971-72	510	288	570	1,368

Source: Statistics Canada, Grain Trade of Canada, Cat.No.22-201 (Ottawa: Statistics Canada, July, 1973).

of additional acreage and/or factor inputs. Considerable land acreage is in summerfallow and estimates indicate that output could be expanded as much as 30 percent by a reduction in fallow.[1] Moreover, chemical fertilizers have not been used to exploit potential gains to their optimum. Hannah indicated that output could have been doubled in 1967 if 50 percent of the producers had used adequate fertilizer.[2]

Barley is one of the principal alternatives to wheat production in the Prairie Provinces.[3] Over one-half of the provinces' barley crop is harvested in Alberta. Barley production in the Prairies was estimated at 570 million bushels in 1973. By 1980, barley production could exceed 690 million bushels through acreage expansion, acreage substitution, and additional factor inputs causing increased yields per acre.[4] If one-half of this increase was converted to hog production, 60 million bushels would constitute input feed for hogs.

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[1] M.L. Lerohl, G.A. MacEachern, and H. Vandermeulen, op. cit., p.88.

[2] A.E. Hannah, op. cit., p.72.

[3] E. Missiaen, and A.L. Coffing. Canada: Growth Potential of the Grain and Livestock Sectors, Foreign Agricultural Economic Report No.77 (Washington, D.C.: E.R.S., U.S.D.A., June, 1972).

[4] The average yield of barley in 1971 was 42.8 bushels per acre; 690 million bushels of barley can be produced by planting 16.2 million acres, using the 1971 average barley yield.

Agriculture producers in Alberta would harvest an addition 60 million bushels of barley if the pattern for barley production within the Prairies persisted.

The major feedgrain for hog production in Western Canada is barley. One author estimates that 14 bushels of barley are required to finish a 210 pound hog.[1] Therefore, an additional 60 million bushels of barley provides the feed requirements for 4.2 million hogs. By 1980 hog production in Western Canada could double if 60 million bushels of barley were diverted into hog enterprises. Prairie producers would market eight million hogs.

At the same time, 30 million bushels of barley would be diverted into Alberta's hog industry. An additional 2 million hogs would be marketed. Consequently, the Alberta hog industry could project a 1980 hog slaughter of approximately 3.7 million to 4 million hogs.

The natural resources for doubling hog production in Western Canada are available. However, before these resources are exploited, producers must receive incentives in both the grain and livestock sectors.

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[1] D.A. Dever, "Marketing Feed Grains and Protein Supplements," Proceedings of the 13th Annual Feed Industry Conference, Canadian Feed Manufacturers Association (Calgary, Sept. 27 & 28, 1973), pp.130-158.

Hog Slaughtering and Processing in Saskatchewan and Alberta

There are ten packing plants slaughtering hogs in Alberta and there are three in Saskatchewan.[1] The majority of their meat products are exported, while a number of small slaughterhouses and custom-kill firms supplement the domestic trade. In Alberta, eighty-four slaughterhouses and eight custom slaughtering firms were operating in 1972.[2]

Eleven slaughterhouses were operating in Saskatchewan in addition to three packing plants in 1974. Although a large number of slaughterhouses are killing hogs, the average kill would range from between 15 to 350 hogs per week. Of the eleven domestic slaughtering plants, an average of approximately forty hogs per week were killed in nine plants. The average weekly hog slaughter for the other two plants is approximately 150 hogs and 350 hogs.[3]

A measurement of industry concentration is obtained by calculating the market share of the largest firms within the industry.[4] Hog slaughtering in Saskatchewan and Alberta is highly concentrated. In Saskatchewan, two meat packing firms accounted for 96 percent of hog slaughterings in 1973 (Table 2.4). Both firms had two plants in production in 1973; however, early in 1974 one firm closed their Regina plant, leaving three meat packing plants in operation. Of the 1,768,000 hogs graded in Alberta in 1973, 80.88 percent were killed by the four largest packing firms. Moreover, 62.72 percent of Alberta's hogs were killed at the Edmonton plants, while the Calgary plants slaughtered 18.16 percent (Table 2.4). In 1973, the five largest packing firms accounted for 86.17 percent of hog slaughterings in Alberta and Saskatchewan combined.

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[1] A packing plant is defined as a firm involved in livestock slaughtering, carcass processing, and exporting of meat products. Conversely, a slaughterhouse is a firm associated with livestock slaughtering and distributing meat products within their local regions.

[2] Alberta Department of Agriculture, Slaughterhouses in Alberta (Edmonton: A.D.A., Statistics Branch, 1972).

[3] Personal communication, Livestock Division, C.D.A., Regina, May, 1974.

[4] J.S. Bain, Industrial Organization (New York: Wiley and Sons, Inc., 1959).

A conservative estimate of potential hog production in Alberta suggests that 3.5 to 4.0 million hogs could be marketed by 1980. If this figure was attained, the question arises: Does the meat packinghouse industry have the slaughter capacity to handle this increased hog volume?

Although the number of firms slaughtering hogs in Alberta and Saskatchewan is highly concentrated, the industry has a problem of excess capacity.[1] Estimates of Alberta beef packing plants suggest a capacity utilization

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[1] Excess capacity is defined as underutilization of maximum potential kill capacity in a single shift. Shifts vary from five to eight hours in length.

TABLE 2.4

TOTAL HOGS SLAUGHTERED IN ALBERTA AND SASKATCHEWAN AND PERCENT SHARE OF LARGEST PACKING FIRMS IN ALBERTA AND SASKATCHEWAN, 1973

Province and City	No. of Hogs Slaughtered	Share of Largest Packing Firms		
		Alta.[1]	Sask.[2]	Two Provinces[3]
		....	Percent	....
Alberta	1,768,000	100.00		65.01
Edmonton	1,108,950	62.72		40.78
Calgary	321,000	18.16		11.80
Sub-total	1,429,950	80.88		52.58
Saskatchewan	951,381		100.00	34.99
Regina	285,414		30.00	10.49
Saskatoon	418,608		44.00	15.39
Prince Albert	209,304		22.00	7.70
Total 5 Cities	2,343,276			86.17
Two Provinces	2,719,381			100.00

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[1] Swift Canadian Co. Ltd., Canada Packers Ltd., Burns Food Ltd., and Gainers Ltd.
[2] Intercontinental Packers Ltd., and Burns Food Ltd.
[3] Five Largest Packing Firms in Alberta and Saskatchewan.

Source: Canada Department of Agriculture, Livestock Division, Edmonton, Alberta and Regina, Saskatchewan, May, 1977.

of between 50 and 90 percent.[1] Similar results are found in plants slaughtering hogs.

Industry estimates for packing plants slaughtering hogs in Edmonton suggest a capacity utilization of between 45 and 65 percent (Table 2.5). This estimate assumes a plant will operate a second shift when hog marketings increase. However, with this increased volume, a number of industry problems are encountered.

Hog production would have to increase rapidly before a plant manager would hire personnel for a second shift. Further, seasonal fluctuations in hog production must be minimized. A packing firm operating a second shift requires a consistent, reliable supply to avoid labor inefficiency. Management practices of hog producers would also require adjustment to ensure hog deliveries at an almost constant weekly volume.

The availability of meat cutters and people willing to work in packing plants poses another serious problem. Finally, although a plant's kill line could easily expand, available cutting facilities and cooler space restrict its hog volume. The marketing of fresh hog sides would be a temporary solution until processing facilities could be

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[1] A.F. Mclean-Bullen, M.M. Veeman, and M.H. Hawkins, Beef Packing and the Cattleman, Situation and Prospects in Alberta , Bulletin No.15 (Edmonton: Department of Extension, University of Alberta, 1973).

TABLE 2.5

ESTIMATED HOG SLAUGHTER CAPACITY AND UTILIZATION AT THE LARGER PACKING PLANTS IN EDMONTON, 1973

Plant	Present [1] Utilization of Capacity	Estimated Weekly Slaughter Potential [2]	
		Single Shift	Double Shift
	percent	.... number of hogs	....
Plant A	45	14,000	25,000
Plant B	65	5,500	8,000
Plant C	50	8,000	12,000
Plant D	55	3,500	6,500

[1] Assuming a plant operates a second shift.
[2] Estimates are made using an eight shift.

Source: Confidential industry sources.

expanded.

Hog Procurement

The Alberta Hog Producers' Marketing Board (A.H.P.M.B.) sells the majority of the hogs slaughtered in Alberta through their teletype system.[1] Eighteen buying machines are located at the major packing plants, assembling offices, and order buyer desks within the province. More than 97 percent of the hogs sold in the province are sold through the present system. The average prices obtained by the A.H.P.M.B. in its teletype procedure are applied in marketing hogs directly to small slaughterhouses. Normally, when hogs are delivered to a custom killing plant, the price that a producer receives in a subsequent sale is estimated by use of average indexes and average prices in his region.

Standards and Grades

Inspected hog slaughter is certified by government health inspectors and government graders. A slaughtered hog is hung on a sliding rail for evisceration. Eviscera is removed and placed in a dish, where government health inspectors examine the liver, lungs, and kidneys for animal disease. The movements of the eviscera dish and the hog carcass on the line are synchronized to isolate diseased carcasses. These are removed on a side rail for disposal.

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[1] For a detailed description of the operation of the A.H.P.M.B. see M.H. Hawkins, A.A. Warrack, J.L. Dawson, and L. Quantz, Development and Operation of the Alberta Hog Producers' Marketing Board , Bulletin No.12 (Edmonton: Department of Extension, University of Alberta, December, 1972).

The carcass is split down the backbone from the pelvis to the neck using a skill saw extended on a spring. As the carcass moves along the line, rollers trip an electric weigh scale which prints the warm carcass weight of the hog (head attached) onto a card. A government or company employee writes the carcass tatoo on the card and pins it on the carcass. A government grader tears the card in half and measures the backfat level at the shoulder and at the lumbar region. The sum of the two measurements is placed on the card. A combination of warm carcass weight and backfat measurement determines the hog index for producer settlement.[1] Carcass sides, excluding the head, are chilled in a cooler with circulating air for twelve hours before further processing.

Commercial Cuts

Hog sides are transferred from the cooler into the processing room using an overhead rail. The carcasses are lowered onto a conveyor belt. An overhead saw splits the side behind the front shoulders, while a skill saw is used to separate the hind quarters. The centre slab is split laterally into loin and belly with a band saw. Peeling knives are used to strip the skin off the loin. Loin fat is trimmed and rendered for lard. Loins can be sold with bone in or boneless for pork roasts and chops, or they may be processed into boneless backs for back bacon production. (Sow back bacon is in high demand by pizza houses because of its uniformity.) The belly portion of the carcass is crushed with a roller, then the spare ribs are peeled off, leaving slab bacon. The thickness of the spare ribs depends on the season, which is inversely related to the seasonal demand for bacon. Spring and summer months tend to be high demand months for spare ribs because of outdoor barbecueing.

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[1] For a detailed explanation of hog carcass grading, consult Canada Department of Agriculture, Canada's New Hog Carcass Valuation System (Ottawa: C.D.A., 1971).

Like the loin, the belly cut is presented to the consumer in many forms, such as derinded, cured, smoked, sliced, or slab bacon. If the belly is derinded, the skins are used to manufacture leather goods or they may be processed into "Piggy Puffs", a substitute for potato chips.

The tail, hind feet, and scrap skin are removed from the hind quarter, leaving the ham. A band saw is used to break the front shoulder into hocks, butt (Boston Shoulder), and picnic. The butt and the picnic are skinned and trimmed of fat. These can be merchandized as fresh, cured, smoked, canned, boned or ground products.

The hams, which constitute approximately 21.0 percent of the carcass, have the hocks removed and are smoked, with a portion being used for canned hams.

Pork Products and Yield

Hog products are normally sold as individual cuts rather than in carcass form. A direct comparison between hog prices and prices of individual hog products is not appropriate because the live hog represents different pork products in varying proportions. An additional problem is that the total salable product accounts for less than three-fourths of the live weight. The most satisfactory method of comparing hog prices with hog products is the computing of the total market value of products produced from a hog.[1]

The yields of various products derived from a live animal vary from one hog to another, depending upon genetic history and weight. Furthermore, methods of production and marketing have changed over time. However, accepting that only minor changes have occurred in hog production and pork merchandising techniques, the percentage yield of pork cuts (on a fresh, and fresh and cured basis) have been calculated for a 210 pound hog (Tables 2.6 and 2.7).

Hogs are processed into a variety of cuts. These are separated into major products, minor products, and by-products. On a fresh basis, an average 210 pound hog will yield 150.98 pounds of product (Table 2.6). Skinned hams, picnics, bellies, loins, and lard are included in major fresh products, comprising 53.97 percent of the live hog. Butts, spareribs, and jowl butts are classified as minor products, amounting to 9.31 percent or 19.55 pounds of the live hog. Neckbones, tail, fore feet, trimmings, snout meat, ears, cheekmeat, heart, liver, tongue, kidneys, brain, and white grease contribute 18.10 pounds of by-product (Table 2.6).

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[1] United States Department of Agriculture, Prices of Hogs and Hog Products 1905-56, Statistical Bulletin No.205 (Washington: U.S.D.A., Agricultural Marketing Service, Livestock Division, March, 1957).

The hams, picnics, and bellies are the major products cured by processors (Table 2.7). Although product processing reduces the yield by 1.87 pounds per animal, higher prices for cured products compensate for shrinkage and additional processing costs. Moreover, processing allows product diversification, which reduces risk against price declines in the fresh product market.

The United States has traditionally accounted for more than 70 percent of Canada's trade in pork products. Chapter III will present an historical resume of trade patterns between Canada and the United States. Western Canada's pork trade with the Pacific region will also be considered.

TABLE 2.6

AVERAGE PERCENTAGE YIELD OF CUTS AND PRODUCT WEIGHT FROM 210 POUND U.S. NUMBER 1,2, AND 3 BARROWS AND GILTS,1945 TO 1956
(Fresh Basis)

Product	Percent of Live Weight	Product Weight
	(%)	(lbs.)
Major		
Hams, smoked, skinned, 12-14 lbs.	12.30	25.83
Picnics, smoked, 6-8 lbs.	6.40	13.44
Bacon, 8-12 lbs.	10.89	22.87
Loins, 8-12 lbs.	9.36	19.65
Lard (one-pound cartons)	15.02	31.54
All major products	53.97	113.33
Minor		
Butts, 4-6 lbs.	5.06	10.63
Spareribs, 3 lbs, and down	1.57	3.30
Jowl butts (loose)	2.68	5.62
All minor products	9.31	19.55
By-products		
Neckbones	1.26	2.64
Tails	.17	.36
Fore feet	.83	1.74
Lean trimmings	3.02	6.34
Snout meat	.30	.63
Ears	.16	.34
Cheekmeat	.45	.95
Heart	.29	.61
Liver	1.00	2.10
Tongre	.40	.84
Kidneys	.25	.52
Brains	.09	.19
White grease	.40	.84
All by-products	8.62	18.10
All Products	71.90	150.98

Source: United States Department of Agriculture, Prices of Hogs and Hog Products, 1905-56, Statistical Bulliten No. 205 (Washington: U.S.D.A., Agriculture Marketing Service, Livestock Division, March, 1957).

TABLE 2.7

AVERAGE PERCENTAGE YIELD OF CUTS AND PRODUCT WEIGHT FROM 210 POUND U.S. NUMBER 1,2, AND 3 BARROWS AND GILTS, 1945 TO 1956 (Fresh and Cured Basis)

Product	Percent of Live Weight	Product Weight
	(%)	(lbs.)
Major		
Hams, smoked, skinned, 12-14 lbs.	11.93	25.05
Picnics, smoked, 6-8 lbs.	6.21	13.04
Bacon, 8-12 lbs.	10.56	22.18
Loins, 8-12 lbs.	9.36	19.65
Lard (one-pound cartons)	15.02	31.54
All major products	53.08	111.46
Minor		
Butts,4-6 lbs.	5.06	10.63
Spareribs, 3 lbs. and down.	1.57	3.30
Jowl butts (loose)	2.68	5.62
All minor products	9.31	19.55
By-products		
Neckbones	1.26	2.64
Tails	.17	.36
Fore feet	.83	1.74
Lean trimmings	3.02	6.34
Snout meat	.30	.63
Ears	.16	.34
Cheekmeat	.45	.95
Hearts	.29	.61
Liver	1.00	2.10
Tongue	.40	.84
Kidneys	.25	.52
Brains	.09	.19
White grease	.40	.84
All by-products	8.62	18.10
All Products	71.01	149.11

Source: See Table 2.6.

CHAPTER III

CANADIAN PORK TRADE WITH THE UNITED STATES

Canada's Pork Exports

Canada's hog production has traditionally exceeded domestic requirements, with approximately five percent of Canadian production being exported.[1]

Exports of pork to the United States averaged 50.6 million pounds annually for the 1965-1969 period, accounting for 91.8 percent of total exports. Between 1969 and 1973 Canadian pork exports more than doubled, from 54.9 million pounds to 102.3 million pounds. Over the same period, the U.S. share of Canada's total pork exports had declined. United States pork imports from Canada accounted for 85.1 and 54.1 percent of Canadian pork exports in 1970 and 1973, respectively (Appendix C, Table C.1).

Most Canadian pork exported to the U.S. is in the fresh, chilled, and frozen categories. During the five-year period, 1965 to 1969, exports of fresh and frozen pork averaged 85.5 percent of pork exports, with processed pork averaging approximately 12 percent and canned pork averaging

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[1] M.H. Hawkins, R.K. Bennett, and A.M. Boswell, North American Hog/Pork Study (Ottawa: Economics Branch, Canadian Department of Agriculture, 1972).

2.6 percent. By 1973, Canada's pork exports of fresh and frozen cuts had increased to 93.1 percent, while the relative share of pork exports in the processed form continued to decline (Appendic C, Table C.2). More than 33 percent of Canadian processed pork exported to the U.S. has been in the form of bacon and sides (Appendix C, Table C.3). Cured, boiled, and canned hams are the other processed pork items being exported to the United States.

Canada's Pork Imports

In 1952, Canada prohibited the importation of uncooked American pork and pork products due to a severe outbreak of vascular exanthema in the United States.[1] These restrictions were removed in 1960, with the eradication of the disease. Since then, the U.S. has been the major exporter of pork to Canada. Of Canada's 1973 pork imports, 94.5 percent were inshipments from the U.S., 85.65 percent of this being fresh and frozen product (Appendix C, Table C.4). Processed pork products imported from the U.S. are primarily cured backs, followed by cured bacon and sides (bellies). Canned hams accounted for 3.3 percent of Canada's processed pork imports from the United States in 1972.

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[1] G.H. Lloyd, "U.S. and Canada Maintain Two-Way Trade in Pork," Foreign Agriculture , 5:16, S 18, 1967.

Canadian Pork Trade Patterns

Canada has been a net importer of processed pork since 1967 (Appendix C, Table C.5). Imports of U.S. processed pork have gradually declined from 9 to 6 million pounds annually. At the same time, processed pork imports from off-shore countries have increased from 350,000 pounds to 8 million pounds. In 1973, Poland exported 1.59 million pounds of canned ham to Canada. Denmark exported 5.46 million pounds of canned luncheon meats to Canada, capturing 77.13 percent of the Canadian canned pork import trade.[1]

Over the last decade, Canadian exports of fresh and frozen pork have increased from 34 million pounds to 114 million pounds (Appendix C, Table C.6). Except for 1969, Canadian exports of fresh and frozen pork have compensated for the negative trade balance in processed pork products. A continuation of the trend is evident. Canadian packing plants have concentrated on increasing their exports of fresh and frozen pork products, while exports of processed pork have declined.

United States Pork Imports

The Meat Import Act of 1964 (P.L.88-482) was based on a market-sharing principle which provided an import quota of 7 or 8 percent of domestic production of fresh, frozen, and chilled beef, veal, pork, mutton, and goat meats. It allowed importers a proportionate share in the growth of the U.S. market.[1] Rising meat prices during 1972, however, led to the June, 1972 suspension of all quota restrictions on imported meat in an effort to increase supplies available to consumers. Since 1965, total pork imports have amounted to approximately 3 percent of domestic hog production (Appendix C, Table C.7). On the other hand, U.S. pork exports range from .5 percent to 1.2 percent of domestic pork production, leaving a net import position of better than 2 percent of domestic pork production.

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[1] Statistics Canada, Imports By Commodities, Cat.No.65-007 (Ottawa: DBS, December, 1973).

United States pork imports have increased at a compound growth rate of 6.7 percent since 1960 (Appendix C, Table C.8). The average quantity imported during the three-year period 1960 to 1962 was 182 million pounds per year. Between 1971 and 1973 the annual average increased to 383 million pounds.

Over 75 percent of U.S. pork imports are canned product (Appendix C, Table C.8). Denmark is the main source of canned ham, shoulder, bacon, and luncheon meat, followed in importance by the Netherlands, Poland, and Yugoslavia. The canned hams are mostly high quality, premium items, usually selling at higher prices than similar U.S. products.[1]

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[1] A. Duymovic, R. Crom, and J. Sullivan, Effects of Alternative Beef Import Policies on the Beef and Pork Sectors, Agricultural Economics Report No.233 (Washington: ERS, U.S.D.A., October, 1972).

Currently, about 16 percent of the pork imported into the United States is fresh and frozen product (Appendix C, Table C.9). Canada is the major supplier of fresh pork imports. Pork imports from Canada have increased by 20 million pounds since 1960. During the same period, Canada's relative position as a supplier of U.S. imports has declined. Pork exports from Canada accounted for 26 percent of U.S. pork imports during 1960, 20 percent in 1965, and 16 percent in 1973. Canada's declining relative position as a supplier of pork to the United States is explained by the sharp increase in imports of canned pork from Europe.

Canadian Pork Exports to the Pacific Region

The average quantity of pork exported from Canada to the Pacific region during the three-year period 1970 to 1972 was 11.2 million pounds per year (Table 3.1). Approximately 89 percent was in the fresh and frozen category.

The Prairie Provinces are the main source of Canadian pork exports to the Pacific region of the U.S. (Table 3.2).

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[1] M.H. Hawkins, R.K. Bennett, and A.M. Boswell, _op. cit._, p.21.

For the 1970 to 1972 period, over 85 percent of the pork imports were from Alberta, Saskatchewan, and Manitoba. The Pacific region receives more than 95 percent of Western Canada's exports of processed pork to the United States. However, only 25 percent of the exports of fresh and frozen product from Western Canada to the United States goes to the Pacific region.[1]

Alberta and Saskatchewan's pork exports to the Pacific region averaged 7.6 million pounds per year for the 1970 to 1972 period (Table 3.3). Their pork exports accounted for 68 percent of Canadian pork exports to Alaska, Washington, Oregon, Hawaii, and California.

Pork exports from Alberta and Saskatchewan to the study area are about equal (Table 3.4). In 1973, Alberta shipped 6.5 million pounds of pork products to the Pacific region. Over 80 percent was from packing plants located in Northern and Central Alberta. During the same period, 6.9 million pounds of pork products were exported into California, Oregon, Idaho, and Washington from Saskatchewan.

The major customers for Alberta and Saskatchewan pork products in the Pacific region are meat processors and meat

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[1] In 1972, about 400,000 pounds of fresh and frozen pork were exported from Manitoba, Saskatchewan, Alberta , and British Columbia to the United States. Over 60 percent was shipped to New York, New Jersey, and Pennsylvania.

TABLE 3.1

EXPORTS OF PORK FROM CANADA TO THE PACIFIC REGION OF THE UNITED STATES, 1969-1972

Year	Fresh & Frozen [1]	Processed [2]	Canned [3]	Total
	....	cwt	....	
1969	23,563	9,892	68	33,523
1970	77,704	10,170	394	88,268
1971	119,427	10,926	35	130,388
1972	105,136	12,813	13	117,962
1970-72	100,755	11,304	147	112,206
% of Total	(89.79)	(10.07)	(0.14)	(100.00)

[1] Primarily Alberta, Saskatchewan, and Manitoba.
[2] 60 percent from British Columbia.
[3] Primarily Alberta.

Source: Data supplied by Statistics Canada, External Trade Division, Information Section at request of Agriculture Canada (Unpublished Material, Ottawa, 1973).

TABLE 3.2

EXPORTS OF PORK FROM THE PRAIRIE REGION TO THE PACIFIC REGION OF THE UNITED STATES, 1969-1972 [1]

Year	Fresh and Frozen	Processed	Canned	Total	Percent of Total Canadian Exports
	....	cwt	....		
1969	22,693	3,703	52	26,448	78.8
1970	75,642	4,463	360	80,465	91.2
1971	111,708	3,442	n.a.	115,150	88.3
1972	95,168	3,631	n.a.	98,799	83.7
1970-72	94,173	3,845	120	98,138	87.5
% of Total	(95.92)	(3.92)	(0.16)	(100.0)	

[1] Prairie Region is Alberta, Saskatchewan, and Manitoba. Pacific Region is Alaska, Washington, Oregon, California, and Hawaii.

Source: Same as Table 3.1.

TABLE 3.3

EXPORTS OF PORK FROM SASKATCHEWAN AND ALBERTA TO THE PACIFIC REGION OF THE UNITED STATES, 1969-1972

Year	Fresh and Frozen	Processed	Canned	Total	Percent of Total Canadian Exports
	....	cwt	....		
1969	20,389	3,703	52	24,144	72.0
1970	60,163	4,329	360	64,852	73.5
1971	83,735	3,416	n.a.	87,151	66.8
1972	74,288	3,631	n.a.	77,919	66.0
1970-72	72,729	3,792	120	76,641	68.3
% of Total	(94.89)	(4.95)	(0.16)	(100.0)	

Source: Same as Table 3.1.

TABLE 3.4

PORK PRODUCTS EXPORTED FROM SASKATCHEWAN AND ALBERTA (REGIONS) TO THE PACIFIC REGION OF THE UNITED STATES,1973

Region	A	B	C	Total
	....	'000 lbs	....	
Northern Alberta	4,088	666	774	5,528
Southern Alberta	823	178	53	1,054
Saskatchewan	4,066	361	2,535	6,962
Total	8,977	1,205	3,362	13,544

A is Northern California.
B is Southern California.
C is Idaho, Oregon, and Washington.

Source: Confidential Industry Sources.

merchandisers in California (Table 3.4). In 1973, meat processors in California imported 10.1 million pounds of pork products from Alberta and Saskatchewan. Over 8.9 million pounds went to meat manufacturers in Northern California. Of the 3.3 million pounds of pork products exported to Idaho, Oregon, and Washington, approximately 67 percent went to processing firms in Washington.

Fresh and frozen pork bellies are the most important import items, followed by pork skins, picnics, and butts, respectively (Table 3.5). Specialty meat processing firms and meat jobbers operating in California and Washington create a market for secondary pork products. More than 700,000 pounds of pork hocks and 200,000 pounds of pork tails were imported from Alberta and Saskatchewan. Sausage and salami manufacturers provide an outlet for head and cheek meat, snouts, trimmings, and pork offal.

The pork trade of Alberta and Saskatchewan's packing firms with meat manufacturers in Idaho and Oregon has predominantly been in fresh and frozen pork bellies (Table 3.5). In 1973, Idaho received 552,000 pounds of Canadian pork bellies while Oregon received 347,000 pounds, about 90 percent and 70 percent, respectively, of their total pork imports from Alberta and Saskatchewan. Butts, picnics, and fresh and frozen hams were imported to a lesser degree.

Fresh and frozen pork bellies account for over 33 percent of pork exports from Alberta and Saskatchewan to California, Idaho, Oregon, and Washington. The most popular size categories were the eight to ten pound, nine to eleven pound, and eleven to thirteen pound bellies (Table 3.6). Of the 4.5 million pounds of pork bellies exported to the Pacific region, 4.0 million pounds were in the above categories. Californian meat processors purchased 57.7 percent (2.6 million pounds) of the pork belly inshipments from Alberta and Saskatchewan, while 22.7 percent of total inshipments were delivered to processors in Washington.

The establishment of an efficient communication system between Canadian suppliers and meat processors in the Pacific region is an essential requirement for market expansion. The main source of customer service is a meat broker in the Pacific region, followed by direct packer sales through the Canadian office and packing firm subsidiaries in the Western states (Table 3.7) Meat brokers alone account for more than 53 percent of Alberta and Saskatchewan pork sales in the Pacific region.

Market penetration also requires a thorough understanding of available supplies and consumer demand in a market area. Criteria influencing the supply and demand for pork products in the Pacific region are evaluated in the next chapter.

TABLE 3.5

EXPORTS OF PORK PRODUCTS FROM ALBERTA AND SASKATCHEWAN, BY PRODUCT CATEGORY, TO CALIFORNIA, IDAHO, OREGON, AND WASHINGTON,1973

Product	California	Idaho	Oregon	Washington	Total
			cwt		
Pork Bellies (F & F)	26,507	5,526	3,474	10,419	45,926
Dry Salt Bellies	779	9	n.a.	n.a.	788
Pork skins	27,320	n.a.	n.a.	n.a.	27,320
Tails	2,027	20	n.a.	n.a.	2,047
Hocks	7,260	n.a.	n.a.	400	7,660
Picnics	7,935	n.a.	501	3,263	11,699
Butts	8,062	n.a.	883	462	9,407
Hams (F&F)	586	603	n.a.	2,708	3,897
Head and Cheek Meat, Snouts and Trimmings	5,654	n.a.	n.a.	715	6,369
Backs and Side Ribs	2,948	n.a.	n.a.	1,354	4,302
Jowls	3,692	n.a.	n.a.	1,432	5,124
Offal	5,428	n.a.	n.a.	1,167	6,595
Spareribs	1,023	n.a.	n.a.	n.a.	1,023
Other	2,603	n.a.	n.a.	681	3,284
Total	101,824	6,158	4,858	22,601	135,441

Source: Same as Table 3.4.

TABLE 3.6

EXPORTS OF FRESH AND FROZEN PORK BELLIES, BY SIZE CATEGORY, FROM ALBERTA AND SASKATCHEWAN TO CALIFORNIA, IDAHO, OREGON, AND WASHINGTON, 1973

Size	California	Idaho	Oregon	Washington	Total
lbs			cwt		
6-8	1,256	n.a.	n.a.	428	1,684
8-10	7,404	822	669	7,063	15,958
9-11	8,677	2,085	1,290	1,374	13,426
10-12	n.a.	n.a.	552	369	921
11-13	5,954	2,619	861	1,185	10,619
12-14	3	n.a.	102	n.a.	105
14-16	2	n.a.	n.a.	n.a.	2
16-18	942	n.a.	n.a.	n.a.	942
18-20	927	n.a.	n.a.	n.a.	927
20-25	1,342	n.a.	n.a.	n.a.	1,342
Total	26,507	5,526	3,474	10,419	45,926
% of Total	(57.7)	(12.1)	(7.5)	(22.7)	(100.0)

Source: Same as Table 3.4.

TABLE 3.7

PRODUCT SALES FROM ALBERTA AND SASKATCHEWAN, BY MARKETING CHANNELS, TO CALIFORNIA, IDAHO, OREGON, AND WASHINGTON,1973

Sales Category	California	Idaho	Oregon	Washington	Total
	....		cwt	....	
West Coast Meat Brokers	67,674	28	n.a.	320	68,022
Mid-Western Meat Brokers	3,507	n.a.	n.a.	1,175	4,682
Direct Purchases	n.a.	n.a.	n.a.	324	324
Canadian Packing Firms(W.Coast)	11,929	n.a.	n.a.	n.a.	11,929
Direct Packer Sales	18,714	6,130	4,858	20,782	50,484
Total	101,824	6,158	4,858	22,601	135,441

Source: Same as Table 3.4.

CHAPTER IV

THE PACIFIC REGION OF THE UNITED STATES

The states of California, Idaho, Washington, and Oregon comprise the market area considered as having export potential for Alberta and Saskatchewan pork products. In estimating this potential, one must consider the fundamental factors influencing long-run supply and demand for pork.

Pork Supply

The relationship between the expected farm price and the quantity supplied is known as the supply function. The amount of a product that farmers are willing to produce is modified by the expected price of the product, expected prices of inputs, expected prices of substitutes and complements in production, and costs of producing substitutes and complements in production.[1] Technological improvements resulting in greater efficiency of capital, labor, and feed conversions are also important.

Within the limits imposed by existing technology, producers attempt to satisfy two criteria. The first is the selection of a combination of factors that will minimize costs for any level of output, given factor prices. Secondly, producers attempt to select the level of output that will maximize the difference between total revenue and total costs, given product prices. In the agricultural sector, a firm will achieve its profit-maximizing position by adjusting output until marginal cost equals product price.[1]

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[1] W.F. Williams and T.T. Stout, Economics of the Livestock-Meat Industry (New York: The MacMillan Company, 1971).

Hog production in the Pacific region (including Montana) has never been significant. It has contributed less than 1.5 percent of the United States' hog production since 1960 (Table 4.1). Hog production in California has declined over the last decade from 89.8 million pounds in 1962 to 53.6 million pounds in 1972. During the same period, hog production in the states of Washington and Oregon declined approximately 20 million pounds from 46.0 and 54.5 million pounds, respectively. Since 1962, hog production in Montana has increased approximately 40 million pounds, reaching 88.4 million pounds in 1972. Idaho's hog production has fluctuated between 37.2 million pounds and 51.8 million pounds in the same time period.

A contributing factor to the decline of hog production

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[1] R.G. Bressler and R.A. King, Markets, Prices, and Interregional Trade (New York: John Wiley and Sons, Inc., 1970).

TABLE 4.1

HOG PRODUCTION IN THE STATES OF WASHINGTON, OREGON, IDAHO AND CALIFORNIA, 1960 TO 1972[1]

Year	Montana	Idaho	Washington	Oregon	California	Total	% OF U.S. Production
	....			'000 lbs			
1960	48,750	43,862	46,026	54,520	89,040	282,198	1.47
1961	61,363	42,771	43,778	57,265	86,166	291,343	1.44
1962	60,450	43,061	43,534	55,260	89,875	292,180	1.44
1963	62,955	49,377	45,139	56,486	84,703	298,660	1.42
1964	59,273	46,942	42,200	50,149	84,404	282,968	1.39
1965	53,722	37,820	31,874	38,337	50,702	282,455	1.18
1966	59,773	37,253	34,847	42,193	54,588	228,654	1.19
1967	59,065	41,194	27,303	44,255	53,749	225,566	1.09
1968	64,124	41,395	28,185	44,302	44,309	222,315	1.05
1969	63,507	40,239	26,302	38,652	43,366	212,066	1.03
1970	70,404	45,833	28,303	42,104	45,846	232,490	1.06
1971	90,382	51,859	29,497	41,681	44,710	258,129	1.12
1972	88,372	41,893	28,739	37,508	53,671	250,183	1.16

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[1] Adjustments are made for changes in inventory and inshipments.

Source: U.S.D.A., Livestock and Meat Statistics, Statistical Bulletin No.333 (Washington: U.S.D.A., ERS, Statistical Reporting Services, annual issues).

on the west coast is that the states of Washington, Oregon, and California are deficit feedgrain states (Table 4.2). In 1970, the states of Washington and Oregon were in a deficit feedgrain position of 196,000 tons and 128,000 tons, respectively. An equivalent conversion to barley would be 13.5 million bushels, while 10.8 million bushels of corn would be required to satisfy the livestock industry's feedgrain demand over regional production.[1] Idaho had a feedgrain surplus of 223,000 tons in 1970.

California imports approximately 45 percent of its feedgrain requirement. Its feedgrain deficit almost doubled between 1961 and 1970. In 1970, California had a feedgrain deficit of 4.0 million tons (equivalent to 166 million bushels of barley), 1.5 million tons above California's feedgrain requirements in 1961.

California livestock producers face higher feedgrain prices compared to surplus grain producing states by approximately the cost of transportation from the surplus area to California. Despite these higher costs, producers there have remained competitive through economies of scale, technical efficiency, and nearness to a large and growing consumer market.[1] Although cattle and poultry producers have maintained their competitive positions compared with other livestock producing regions in the United States, hog producers have slowly dropped out of production and/or shifted their productive resources to alternative farm enterprises. California packing plants have responded to the decline in local hog supplies by purchasing live hogs from other states.

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[1] Bushel conversion rates of 48 pounds and 60 pounds were used in this estimate for barley and corn, respectively.

In 1972, 1.5 million hogs were slaughtered in state and federally inspected packing plants in California. Of these, 1.27 million hogs were truck and rail inshipments (Appendix D, Tables D.1 and D.2). Rail inshipments, via triple decked cars from Iowa, Kansas, Missouri, and Nebraska, accounted for approximately 95 percent of the 1972 hog inshipments.

Consumer Demand

The relationship between factors that affect consumption and the consumption of a commodity is known as the demand function. Population, age distribution, size of households, per capita incomes, distribution of income, tastes and preferences, promotion and merchandising, price of the product, and prices of substitutes and complements

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[1] H.F. Carman, California's Competitive Position in Cattle and Poultry Production (Berkeley: Agricultural Extension Service, Agr. Exp. St., Giannini Foundation of Agricultural Economics, October, 1972).

TABLE 4.2

FEEDGRAINS: DEFICIT OR SURPLUS FOR THE STATES OF IDAHO, WASHINGTON, OREGON AND CALIFORNIA, 1961 TO 1970[1]

Year	Idaho	Washington	Oregon	California
	....	'000 tons	....	
1961	+102	- 39	-166	-2,505
1962	+286	- 28	- 89	-2,472
1963	+337	- 45	-111	-2,525
1964	+158	-199	-126	-1,815
1965	+192	-468	-177	-2,458
1966	-102	-400	-206	-3,741
1967	- 26	-687	-417	-3,210
1968	-168	-666	-392	-3,801
1969	+ 20	-485	-237	-4,473
1970	+223	-196	-128	-4,014

[1] Additional disappearance not included in this computation. Feedgrains include that needed for seed, human food, and export.

Source: U.S.D.A., National and State Livestock -Feed Relationships, Statistical Bulletin No.446 (Washington: U.S.D.A., ERS, various issues); U.S.D.A., Livestock - Feed Relationships, Statistical Bulletin No.337 (supp.) (Washington: U.S.D.A., ERS, various issues).

all influence consumption.[1]

The demand function is based on the assumption that consumers attempt to maximize satisfaction or utility, given a level of income and a choice between commodities. Further, it is assumed that each consumer has adequate information pertaining to his consumption decisions; i.e., the full range of goods and services available, the capacity of each good and service to satisfy a want, the exact price of each good and service, the knowledge that his actions in the market will not affect prices, and his exact money income during the planning period.[2]

Population could be expected to have a proportional effect on consumption--if population doubled, then consumption should double, ceteris paribus . Unfortunately, other things do not remain constant over time, including price, consumer expectations, age of population, and income distribution.

The population of the four Northwestern states (California, Idaho, Oregon, and Washington) in 1972 totaled

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[1] W.A. Cromarty, "Free Market Price Projections Based on a Formal Econometric Model," Journal Farm Economics , Vol.43 (1961), pp.365-382; R.A. Holmes, The Estimation of Demand Elasticities for Substitute Foods (Ottawa: AERCC, 1966); Z. Yankowsky, "Agricultural Demand and Supply Projections for 1980," Canadian Farm Economics , Vol.6 (February, 1969), pp.11-17.

[2] C.E. Ferguson, Microeconomic Theory (Homewood: Richard D. Irwin Inc., 1972).

26.8 million. Three-quarters of this population resided in California, with 10.6 million people concentrated in the Los Angeles-Long Beach and San Francisco-Oakland metropolitan centres (Table 4.3).

The effect of long-run changes in income are well known. The percentage of income spent on food declines as income rises, although absolute food expenditures may increase. The composition of the diet also shifts with consumer affluence. consumers become conscious of nutrition, and tastes AFFLUENCE. shift from starchy carbohydrate foods towards higher protein diets.[1] At the same time, variety in diets and quality selection become important purchasing criteria for consumers with rising incomes.[2]

The per capita personal income in the United States averaged $4,157 in 1971 compared to $3,405 in Canada (Table 4.4). Consumer income in the major metropolitan cities of the Pacific region was at least $500 higher than the income of the average Canadian consumer. At the same time, their per capita personal incomes (excluding Los Angeles-Long Beach and San Francisco-Oakland) fluctuate around the

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[1] A.F. McCalla, *World Food Supply and Demand Situation* (a paper presented at the Proceedings of National Conference on Challenges in Food Marketing, Edmonton, Alberta, March 5,6,7, 1974), pp.7-13.

[2] W.F. Williams and T.T. Stout, *op. cit.*, p.554.

TABLE 4.3

POPULATION FOR THE UNITED STATES, THE STATES OF CALIFORNIA, IDAHO, OREGON, AND WASHINGTON AND MAJOR CITIES, 1966 TO 1972

State or City	1966	1967	1968	1969	1970	1971	1972
	.... millions						....
California	18.67	18.96	19.18	19.44	19.95	20.28	20.47
Idaho	0.70	0.70	0.71	0.71	0.74	0.74	0.75
Oregon	1.96	1.97	2.00	2.03	2.09	2.14	2.18
Washington	3.07	3.19	3.29	3.41	3.41	3.44	3.44
Total	24.40	24.82	25.18	25.58	26.16	26.60	26.84
United States	196.60	198.70	200.70	202.70	204.90	207.00	208.80
% of U.S.	12.41	12.49	12.54	12.62	12.76	12.85	12.85
L.A.-Long Beach	6.81	6.89	6.93	6.99	7.03	7.06	7.34
San Francisco-Oakland	3.00	3.04	3.07	3.09	3.11	3.16	3.25
San Jose	0.94	0.97	1.00	1.03	1.06	1.11	1.16
Sacremento	0.76	0.77	0.77	0.78	0.80	0.82	0.85
Boise	0.10	0.10	0.10	0.11	0.11	0.12	0.12
Portland	0.92	0.94	0.96	0.99	1.01	1.05	1.07
Seattle-Everett	1.24	1.31	1.37	1.40	1.42	1.43	1.50
Spokane	0.27	0.27	0.27	0.27	0.29	0.29	0.29
Tacoma	0.36	0.37	0.39	0.40	0.41	0.42	0.43

Source: United States Department of Commerce, Bureau of the Census, Population Estimates and Projections, (Washington: U.S. goverment printing office, 1965-1972).

TABLE 4.4

PER CAPITA PERSONAL INCOME FOR CANADA, THE UNITED STATES AND SELECTED CITIES WITHIN THE PACIFIC REGION, 1966 TO 1973

City	1966	1967	1968	1969	1970	1971	1972[1]	1973[1]
					dollars			
L.A.-Long Beach	3,806	4,011	4,331	4,629	5,087	5,087	5,313	5,544
San Francisco-Oakland	4,077	4,346	4,694	5,028	5,336	5,633	5,946	6,270
San Jose	3,335	3,567	3,934	4,227	4,389	4,572	4,763	4,954
Sacramento	3,095	3,237	3,464	3,638	3,881	4,098	4,327	4,570
Boise	2,791	2,948	3,110	3,425	3,745	3,994	4,259	4,541
Portland	3,281	3,477	3,742	4,001	4,199	4,436	4,686	4,947
Seattle-Everett	3,667	3,955	4,232	4,439	4,435	4,484	4,533	4,583
Spokane	2,934	3,195	3,447	3,733	3,800	4,050	4,316	4,594
Tacoma	2,841	3,095	3,429	3,650	3,802	3,910	4,021	4,132
United States	2,970	3,170	3,436	3,708	3,932	4,157	4,395	4,644
Canada[2]	2,303	2,482	2,689	2,943	3,124	3,405	3,756	4,228

[1] Authors' estimates.
[2] Canadian currancy.

Source: U.S. Department of Commerce, Survey of Current Business, Vol. 53, No. 5 (Washinton: Bureau of Economic Analysis, May, 1973); Statistics Canada, Canadian Statistical Review, Cat. No. 11-003 (Ottawa: Statistics Canada, various issues).

U.S. average of $4,157. Per capita personal incomes in the metropolitan centers of Los Angeles-Long Beach and San Francisco-Oakland exceeded the 1971 U.S. national average by $940 and $1,576, respectively.

A region with a large population base and a high income bracket provides an excellent market potential for red meats. Several studies have evaluated California's meat industry.[1] The reports indicate that California has been, and will continue to be, a beef-consuming state because of its consumer affluence.

Regional per capita consumption calculations for meats indicated that pork consumption in California was below the national average from 1955 to 1961 by approximately ten pounds (Table 4.5). By 1971, it was estimated that the per capita pork consumption spread between California and the United States average had increased to twenty-four pounds. Projections to 1980 indicate that this spread will remain above fifteen pounds, while per capita pork consumption will decline from the 1971 level.

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[1] J.H. Cothern, The California Meat Industry. A Summary of Recent Trends and Prospects for the Future (Paper presented at the Livestock Research Advisory Committee Meeting, Davis, November 28-29, 1972); J.H. Cothern, Principle Factors Affecting the Demand for Meat in California (paper prepared for the American Livestock and Meat Board, August 19, 1973); A.B. Richards and P.J. Biaggi, Trends and Outlook. California and the United States Meat Packing Industry , Cal. Agr. Exp. St., Circular 518 (Davis: Giannini Foundation, January, 1963).

TABLE 4.5

PER CAPITA CONSUMPTION OF PORK IN CALIFORNIA AND THE UNITED STATES, SELECTED YEARS

Region	1955	1961	1971	1980
	....	pounds	....	
United States	62.1	61.0	73.0	63.0
California	52.0[1]	51.6	49.1	47.0

[1] California, Oregon and Washington.

Source: A.B. Richards, and P.J. Biaggi, Trends and Outlook. California and the United States Meat Packing Industry, Cal. Agr. Exp. St. Circular 518 (Davis: Giannini Foundation, January, 1963); J.H. Cothern, Principle Factors Affecting the Demand for Meat in California (Paper Prepared for the American Livestock and Meat Board, August 19, 1973).

Although the studies portray a certain skepticism toward the possibility of expanding pork consumption in California, they assume pork will be merchandised in its traditional form. Canadian pork products have never been promoted in California. The market appears ripe for an aggresive, imaginative meat merchandiser who concentrates on promoting lean, nutritious, and price competitive pork products.

Potential Consumption

Pork consumption is positively associated with income in the Western United States.[1] At the same time, per capita pork consumption is below the national average by at least ten pounds. This indicates that a market is available for exploitation by a growth conscious industry.

Industry growth can be accomplished by expanding the various firms' activities for their particular products, and/or by changing the composition of the product.[2] Ansoff proposed that market penetration, market development, product development, and diversification are the four growth strategies based on cross-classifying product-market extension possibilities.[1] His strategies are illustrated in Figure 4.1, and are defined as follows:

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[1] W.F. Williams and T.T. Stout, _op_. _cit_., pp.553.

[2] F.D. Sturdivant, _et al_., _Managerial Analysis in Marketing_ (Glenview: Scott, Foresman, and Company, 1970).

1. Market Penetration: A firm seeks increased sales of its present products in its present markets through more aggresive promotion and distribution.

2. Market Development: A firm seeks new markets for its present products.

3. Product Development: A firm seeks increased sales by developing new products for its present markets.

4. Diversification: A firm seeks increased sales by developing new products for new markets.

Market penetration is the most obvious means for industry growth. Firms utilize existing production and distribution facilities for their products. Further, they attempt to increase their market shares by complementing an aggresive promotional campaign with a low product price. A minimum price strategy is feasible in a price-sensitive market, where production and distribution economies can be captured, and when firm entry into the industry is restricted.[2]

When an existing product's life cycle approaches a

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[1] H.I. Ansoff, "Strategies for Diversification," Harvard Business Review , September-October, 1957, pp.113-124.

[2] P. Kotler, Marketing Management: Analysis, Planning, and Control (Englewood Cliffs: Prentice-Hall, Inc., 1972).

FIGURE 4.1

GROWTH VECTOR COMPONENTS

PRODUCT / FIRM ACTIVITY	PRESENT	NEW
PRESENT	Market Penetration	Product Development
NEW	Market Development	Diversification

Source: H.I. Ansoff, Corporate Strategy (New York: McGraw-Hill, 1965), p.128.

downward trend, an industry can be revitalized by discovering new uses for its products. Unfortunately, pork has few alternative uses other than consumption. Thus, industry revitalization must occur through product development. The firm responds to, and/or creates, new consumer wants by altering the form of the product.

A potential for expanding the sale of pork products in the Pacific region does exist. Successful pork advertising and promotion hinges on the imagination and creativity of industry members. A multi-faceted promotional campaign must create a schism between the live pig and pork products in the consumer's mind. Furthermore, the psychological stigma that pork is an inferior meat in terms of nutritional and health qualities should be diminished.

Accepting that the meat industry is willing to undertake an expensive and prolonged advertising and promotional campaign, per capita pork consumption in the Pacific region could increase by fourteen pounds and reach the national average by 1980 (Table 4.5). Furthermore, by 1980, 30.47 million people would reside in the Pacific region if average five-year population growth rates (1967-1972) of 1.6 percent continue. Therefore, an additional 426 million pounds of pork would be required to satisfy consumer demand.[1]

Presently, Canada's pork exports to the United States account for 16 percent of the United States pork imports (Appendix C, Table C.9). Consequently, Canadian pork exports to the Pacific region could increase by 68.16 million pounds. Assuming that an average Canadian hog yields 150 pounds of consumable product, 454,000 hogs will be required to fulfill demands. If the traditional Canadian pork trade patterns with the Pacific region prevail, Alberta and Saskatchewan would capture 68 percent of this volume--an equivalent of an additional 308,000 hogs per year.

The geographic proximity of the Pacific region to Alberta and Saskatchewan reinforces Canada's competitive position for expanding its market share. Identifying market factors that may alter this competitive position is paramount if successful strategies for market penetration are to be incorporated. The theoretical framework used to identify market variables that influence Alberta and Saskatchewan pork trade with the Pacific region is developed in the next chapter. The development of an econometric model with an a priori interpretation of the expected results completes the chapter.

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[1] Total pork demand for the Pacific region of the U.S. is estimated at 1,919 million pounds by 1980 if per capita pork consumption in the U.S. is 63 pounds.

CHAPTER V

SPECIFICATION OF THE ECONOMIC MODEL

The Pacific region of the United States provides a market potential for expanding Western Canada's pork exports. Business firms engaged in the purchase, processing, distribution, and/or sale of meat products in this region are already purchasing pork products from Alberta and Saskatchewan packing firms. However, they are also purchasing pork products from meat suppliers in their immediate vicinity and other United States regions, particularly the Mid-Western states of Iowa, Nebraska, Colorado, and South Dakota. The decision of meat processors in the Pacific region to purchase pork products from Alberta and Saskatchewan meat packing plants instead of packing plants operating in the Mid-Western United States is influenced by a number of factors. These factors can be evaluated by developing an econometric model, the objective of which is to isolate market variables that will assist in predicting when a meat processing firm will, or will not, purchase Canadian pork products over their United States counterparts. In doing so, those variables that alter existing and potential pork supplies in each supply region are identified. Furthermore, variables that influence pork consumption in the Pacific region must be considered.

The econometric model formulated attempts to explain the weekly flow of pork products from Alberta and Saskatchewan into California, Idaho, Oregon, and Washington. Often, insufficient data places a model's reliability in question. However, the identification of independent variables explaining the variation in the dependent variable is paramount in developing an empirical model. Accordingly, it is hypothesized that the purchasing behavior of a processing firm operating in the Pacific region of the United States is influenced by: (1) the wholesale price spread of pork cuts between supply regions; (2) regional slaughter; (3) the farm price spread of hogs marketed in different supply regions; (4) local slaughter; (5) regional pork stocks; (6) the retail price of pork in the firm's region; and (7) the season. An explanation of each of these variables will follow.

Theoretical Framework

The survival of a firm in the long run depends upon the entrepreneur's ability to maintain a profit. Purchasing raw materials from the cheapest source of supply and selling processed products at maximum prices partially accomplishes his profit maximization goal.[1] Alternatively, a firm may be content with a profit level below the optimal point. In this situation, factor price is not the only determinant altering an entrepreneur's purchasing behavior. Reliability of supply, physical risk, product yield, and maintenance of market share through servicing accounts with quality products are important decision considerations.

Profit is the principle motive for firms to engage in interregional trade. Logically, an importing firm would purchase raw materials from another region if it could pay a delivered price lower than the local price for raw materials. On the other hand, an exporting firm would benefit by transferring products to another region if it received an f.o.b. price higher than in the home market. A necessary condition for interregional trade is that the price differences among regions exceed transfer costs. If relative prices differ by more than transfer costs between regions, trade will occur because of the individual traders' incentive for profits.[2]

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[1] The assumption that capital and labor inefficiencies are minimal and that the firm is not vertically integrated are implied. It is also assumed that a processing firm is operating in the absence of contracts with either their suppliers or clientele. Finally, the assumption that a firm maintains its profit maximization criteria by equating MC=MR is a necessary condition.

[2] W.F. Williams and T.T. Stout, Economics of the Livestock-Meat Industry (New York: The MacMillan Company, 1971).

A meat processor has the option of purchasing supplies from a number of regional markets. Each market is operating with perfect or near perfect knowledge and homogeneity of both products and factors.[1] The wholesale price of pork products in each market varies inversely with supply. Therefore, a price quote from a market reflects available supplies in that market.

If a Californian meat processor is price conscious and receives price quotes f.o.b. his plant from various regions, the volume of product purchased from packing plants in Western Canada rather than from meat suppliers in the Mid-Western United States is reflected by different price spreads (i.e., the meat processor's local plant price minus regional price, X_i, where $i=(1,2,...,n$ regions)). The larger the Californian meat processor's price spread with the Prairie region, the larger the volume of pork products purchased from Canadian meat suppliers.

The local price quote to Californian meat processors is a common factor when calculating price spreads between California and different supply regions. Furthermore, accepting that transfer costs and product quality from each region are approximately equal, the volume of pork products purchased from each region can be measured directly using a price spread between the Canadian Prairies and the Mid-Western United States, i.e., region A minus region B.[1] Product inshipments from Canada will increase as this price spread widens.

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[1] Perfect or near perfect knowledge in the meat industry is provided by an efficient communication system. Homogeneity of products means that hogs in different regions are processed to produce similar product cuts.

An inverse relationship exists between the quantity of hogs marketed in a region and producer price, assuming consumer demand for pork is more or less constant.[2] Furthermore, a positive correlation occurs between farm and

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[1] Given three regions--California, the Mid-Western states, and the Canadian Prairies--designated as regions A, B, and C, respectively. Formulating two price spreads using the price in California as a focal point, we have:

$$B - A = X$$

$$C - A = Y$$

Rearranging these equations:

$$B = X + A$$

$$C = Y + A$$

If we wish to find the price spread between B and C, the common price 'A' cancels out.

$$\begin{aligned} B - C &= (X + A) - (Y + A) \\ &= X - Y \end{aligned}$$

[2] A.A. Harlow, Factors Affecting the Price and Supply of Hogs, Technical Bulletin No.1274 (Washington: U.S.D.A., 1962); R.M. Leuthold, "An Analysis of Daily Fluctuations in the Hog Economy," American Journal of Agricultural Economics, Vol.51 (1969), pp.849-865; L.D. McClements, "The Specifications of Pig Supply Models," Farm Economist, Vol.11 (1969), pp.425-428.

wholesale prices.[1] Therefore, an increase in hog marketings by Canadian hog producers should increase the amount of pork exported from Canada to the Pacific region. The spread for wholesale prices between California and the Canadian Prairies has widened. On the other hand, regional imports should be inversely related to the number of hogs slaughtered in California. An increase in the Californian hog slaughter, and therefore available supplies, will depress local wholesale prices. The favorable relative position of purchasing local, instead of regional, raw materials should cause an adjustment in the purchasing behavior of California meat processors. A manager's profit motive will cause a substitution of local pork products for imported product. Thus, it is hypothesized that pork imports into the Pacific region will decline until returns on investment, utilizing imported instead of local factors of production, are sufficient to stimulate trade.

A principal objective of a firm is to coordinate its financial transactions, production processes, and marketing efforts. In accomplishing this goal, a firm establishes a continuity between purchasing raw materials and selling processed or semi-processed goods. The accumulation of inventories caused by a downward trend in the business cycle, however, disrupts this continuity. A firm's cash flow is disrupted.

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[1] The assumption that meat packing firms are not speculating on meat stocks is necessary, and thus, that wholesale prices reflect immediate changes in farm prices.

The market share of packing plants and meat processors in the meat industry is important. A reduction in the market share of a packing firm intensifies the financial stress caused by the accumulation of inventories, thus forcing adjustments in marketing strategies. In a price sensitive market, plant managers adjust prices downward in an attempt to retain present customers and establish new accounts. Therefore, as pork inventories accumulate, Canadian meat suppliers will lower the wholesale price of Canadian pork products. Lower price quotes from Canadian suppliers to meat processors in the Pacific region should stimulate trade.

A number of studies have found that pork consumption varies inversely with price. Using annual postwar data, 1949-64, excluding 1952, Holmes reports a price elasticity of -1.69 for the retail demand for pork.[1] Price elasticities measure the effect of a price change on the quantity of pork consumed. Holmes's results reveal that the quantity of pork consumed will decline 16.9 percent for every 10 percent increase in the price of pork. However, this estimate appears high. Brandow, using 1948-58 data which were adjusted to reflect 1955-57 conditions, found a -.75 price elasticity for pork.[1] The price elasticity coefficient for pork developed by Myers, Havlicek and Henderson in their monthly model for the 1949-66 period varied from a low of -.64 in December to a high of -.84 in July.[2]

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[1] R.A. Holmes, Estimation of Demand Elasticities for Substitute Foods (Ottawa: Agricultural Economics Research Council of Canada, 1966).

Retail prices respond to changes in available supplies. An increase in the price of bacon indicates that either an outward shift in the demand curve or a decline in available supples has occured. Since consumer demand is relatively stable in the short run, price alterations can be attributed to variations in local supplies. Furthermore, if regional supplies have increased, maintaining or depressing the regional wholesale price, regional imports are more attractive to a local meat processor. Therefore, an increase in the retail price of pork products should stimulate a meat processor's incentive to import regional pork products.

Seasonal shifts in consumer tastes and preferences for pork also occur.[1] Myers, Havlicek, and Henderson discovered that consumer demand for pork in the United States from January to April is erratic. The period from July through December, however, is characterized by a steady and rather sharp demand increase, peaking in December.

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[1] G.E. Brandow, Interrelations Among Demands for Farm Products and Implications for Control of Market Supply, Bulletin 680 (University Park, Pennsylvania: Pennsylvania State University, August, 1961).

[2] L.H. Myers, J. Havlicek Jr., and P.L. Henderson, Short-Term Price Structure of the Hog-Pork Sector of the United States, Bulletin 855 (LaFayette, Indiana: Purdue Agricultural Experiment Station, February, 1970).

Accepting the postulated economic factors influencing the flow of pork products from Alberta and Saskatchewan packing firms to meat processors in the Pacific region, a number of economic models can be selected.

The Models Selected

The application of statistical methods to economic theory is accomplished through econometrics. It allows the measurement of economic relations and, in the process, the testing of economic hypotheses.

An econometric model is developed and considers the postulated economic factors that explain the export of pork products from Alberta and Saskatchewan into California, Idaho, Oregon, and Washington. At the same time, empirical models explaining the export of pork bellies into the Pacific region, and the export of eleven to thirteen pound pork bellies into California, are specified. The three trade-behavioral functions are specified as follows:

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[1] M.L. Hayenga and D. Hacklands, "Monthly Supply-Demand Relationships for Fed Cattle and Hogs," American Journal of Agricultural Economics, Vol.52 (1970), pp.535-544; B.F. Stanton, "Seasonal Demand for Beef, Pork, and Broilers," Agricultural Economics Research, Vol.13 (1961), pp.1-12.

$$QP = \phi\ FPS_{(t)}, HSAS_{(t-1)}, HSUS_{(t-1)}, TPS_{(t-1)}, D_{npf}, D_s, D_r$$

$$QPB = \phi\ FPS_{(t)}, HSAS_{(t-1)}, HSUS_{(t-1)}, PS_{(t-1)}, D_{npf}, D_s, D_r$$

$$QET = \phi\ WPS_{(t-1)}, HSAS_{(t-1)}, HSUS_{(t-1)}, HSC_{(t-1)}, PSAS_{(t-1)}, D_{npf}, D_s, PB_{(t-1)}$$

where:

QP = volume of pork shipped from Alberta and Saskatchewan (cwt.),

QPB = volume of pork bellies shipped from Alberta and Saskatchewan into the Pacific region of the United States (cwt.),

QET = volume of 11 to 13 pound bellies shipped from Alberta and Saskatchewan into California (cwt.),

FPS = farm price spread hogs--U.S. minus Canadian ($/cwt.),

HSAS = Alberta and Saskatchewan hog slaughter (1000 hd.),

HSUS = United States hog slaughter (1000 hd.),

HSC = California hog slaughter (1000 hd.),

TPS = Alberta and Saskatchewan pork stocks (1000 lbs.),

WPS = wholesale price spread for 11 to 13 pound pork bellies in U.S. dollars--Canadian minus U.S. price (¢/lb.),

PS = pork belly stocks in Alberta and Saskatchewan (1000 lbs.),

PSAS = pork belly stocks in Alberta and Saskatchewan 12/down (1000 lbs.),

PB = retail price of bacon in San Francisco (¢/lb.),

D_{npf} = dummy variable representing the United States price freeze,

D_s = dummy variable representing seasons of the year,

D_r = dummy variable representing Canadian rail strike on perishable commodities,

t = time in weeks.

Specification of the Model

Choosing the correct mathematical relationship between the dependent variable and the explanatory variables creates a specification problem for the analyst. Theil indicates that the residual-variance criterion for choosing among alternative specifications is used extensively.[1] This technique employs the division of the residual sum of squares by the appropriate number of degrees of freedom ($n-k$ and $n-k_0$). The specification with the smallest residual-variance estimate is chosen.

Theil states that statistical procedures should not be the only tools for handling the specification problem. When using economic interpretation on _a priori_ grounds, an analyst may feel that one specification is more realistic than another, although the estimated residual variance is larger. In this case, the latter specification should be chosen. The real test as to a correct or incorrect model specification is given by the level of confidence an analyst can place in his specified model as indicated by a number of statistical tests. These are discussed in Chapter VI.

Multi-Variable Linear Analysis

The Model

If an analyst expects a dependent variable Y_i ($i=1,2,\ldots,n$) to be linearly related to a set of independent variables X_i ($i=1,\ldots,k$), the relationship may be tested by the application of a multi-variable linear model. We formulate the problem in terms of the multiple regression form:

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[1] H. Theil, _Principles of Econometrics_ (New York: John Wiley and Sons, Inc., 1971), pp.540-546.

$$Y = a + B_1X_1 + B_2X_2 + B_3X_3 + \text{---} + B_kX_k + u$$

where, for n observations, we have:

Y = the dependent variable,

Xi (i=1,2,....,k) = the K independent (or explanatory) variables,

a = the unknown constant term,

Bi (i=1,2,....,k) = the unknown (constant) slopes,

u = the unknown residual.[1]

The Bi coefficients expressed in this equation are the partial regression coefficients. The partial regression coefficient of Y represents how much Y will change per unit change in Xi, provided the other variables do not change. The u value is a column of unobservable random errors which account for the effects on Y of all unidentifiable factors.[2]

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[1] M.S. Anderson, "Basic Statistics and Miscellaneous Notes," Agricultural Economics 416 Handouts, University of Alberta, Edmonton, Fall, 1972.

[2] C.F. Christ, Econometric Models and Methods (New York: John Wiley and Sons, Inc., 1966), p.456.

The Assumptions [1]

1. The model assumes linearity in the functional relationship between the dependent and independent variables. Further, there are no appreciable differences between the observed values of Y and X and their true values.

2. The random error, u, a real variable, is normally distributed, has a mean of zero, and has constant variance. Moreover, all the random errors are independent of each other and of the independent variables. The reliability of a model's predictive value necessitates the assumption that there is no correlation between u_t and u_{t-1}.

3. The independent variables are a random set of numbers with a mean and variance. Further, the Xi's are independent of each other, of a, and of Bi.

4. The number of observations exceeds the number of parameters to be estimated.

The Empirical Model

Weekly time series data for 1973 were transformed into natural logarithmic terms such that the coefficients of the independent variables would be expressed as elasticities.

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[1] J. Johnson, *Econometric Methods* (New York: McGraw-Hill Book Company, 1972), pp.121-123.

An equation expressed in logarithmic form provides elasticities that are constant over the entire range of data, thus easing the interpretation of the results. Conversely, elasticities calculated from a regression equation using normal data, are point elasticities calculated at the specified levels for the respective variables.

An implication arises when a number of the observations of the variables are negative. Logarithms of negative numbers are imaginary. Therefore, the data must be adjusted to render all observations positive. At the same time, the relationships between the dependent variables, Y, and explanatory variables, Xi (i=1,2,...,k), must remain unaltered. The technique of adding a scalar (constant) to all observations provides the desired result by shifting the coordinates of the endogenous and exogenous variables into the positive quadrants. The scalar is removed by subtraction after the regression coefficients are estimated.[1]

The use of dummy variables in regression analysis deserves a brief explanation prior to the specification of the statistical models. When time series data can be divided into two distinct classes, then a variable with a value of zero in one period and a value of one in another is introduced into the regression equation. This situation may arise from an institutional or structural change, such as price controls in one period and withdrawal of them in another.

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[1] L.A. Malmberg, "The Indifference Relation and Futures Spreads," (Unpublished M.Sc. thesis, University of Alberta, Department of Agricultural Economics and Rural Sociology, 1970).

Zero-one variables are also used with quarterly observations to predict seasonal variations. It is assumed that seasonal influences affect the behavioral relationships but do not affect the slope coefficients. Zero-one variables simply shift the intercept of the equation.[1]

Finally, in the event of a curvature regression, the use of linear regression yields biased estimates. By partitioning the scale of a measured variable into intervals and defining a set of dummy variables for them, unbiased estimates are obtained since the regression coefficients of the dummy variables conform to any curvature that is present.[2]

Three equations incorporating the major variables expected to influence weekly exports of pork products from

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[1] W.G. Tomek, "Using Zero-One Variables with Time Series Data in Regression Equations," Journal of Farm Economics, XL (1963), pp.813-822.

[2] D.B. Suits, "Use of Dummy Variables in Regression Equations," Journal of the American Statistical Association, Vol.52 (1957), pp.548-551.

Alberta and Saskatchewan into the Pacific region of the United States are specified. The ordinary least squares procedure is used to estimate the parameters of the postulated demand and supply relations. The statistical models are expressed as:

$$\log_e \hat{Y}_1 = \log_e \hat{B}_o + \hat{B}_1 \log_e X_1 + \hat{B}_2 \log_e X_2 + \hat{B}_3 \log_e X_3 + \hat{B}_4 \log_e X_4 + \hat{B}_5 \log_e X_5 + \hat{B}_6 \log_e X_6 + \hat{B}_7 \log_e X_7 + v_1$$

$$\log_e \hat{Y}_2 = \log_e \hat{B}_o + \hat{B}_1 \log_e X_1 + \hat{B}_2 \log_e X_2 + \hat{B}_3 \log_e X_3 + \hat{B}_5 \log_e X_5 + \hat{B}_6 \log_e X_6 + \hat{B}_7 \log_e X_7 + \hat{B}_8 \log_e X_8 + v_2$$

$$\log_e \hat{Y}_3 = \log_e \hat{B}_o + \hat{B}_2 \log_e X_2 + \hat{B}_3 \log_e X_3 + \hat{B}_5 \log_e X_5 + \hat{B}_7 \log_e X_7 + \hat{B}_9 \log_e X_9 + \hat{B}_{10} \log_e X_{10} + \hat{B}_{11} \log_e X_{11} + \hat{B}_{12} \log_e X_{12} + v_3$$

where:

Y_1 = volume of pork shipped,

Y_2 = volume of pork bellies shipped,

Y_3 = volume of 11 to 13 pound pork bellies shipped into California,

X_1 = farm price spread in period,

X_2 = Alberta and Saskatchewan hog slaughter lagged one week,

X_3 = United States hog slaughter lagged one week,

X_4 = Alberta and Saskatchewan pork stocks lagged one week,

X_5 = zero-one dummy variable for United States price freeze,

X_6 = zero-one dummy variable for Canadian rail strike on perishable commodities,

X_7 = zero-one dummy variable for season $(S_1,\ldots,S_4)$,

X_8 = pork belly stocks in Alberta and Saskatchewan lagged one week,

X_9 = wholesale price spread for 11 to 13 pound bellies lagged one week,

X_{10} = pork belly stocks 12/down in Alberta and Saskatchewan lagged one week,

X_{11} = hog slaughter in California lagged one week,

X_{12} = price of bacon in San Francisco-Oakland Bay region lagged one week,

B_1 = elasticity of the farm price spread expressed as a change in the price spread w.r.t. a change in the quantity of pork products exported,[1]

B_2 = elasticity of hog slaughter expressed as a change in the quantity of hogs slaughtered in Alberta and Saskatchewan w.r.t. a change in the quantity of pork products exported,

B_3 = elasticity of U.S. hog slaughter expressed as a change in the quantity of hogs slaughtered in the United States w.r.t. a change in the quantity of pork products exported,

B_4 = elasticity of pork stocks in Alberta and Saskatchewan expressed as a change in the quantity of pork stocks in Alberta and Saskatchewan w.r.t. a change in the quantity of pork products exported,

$B_{5,6,7}$ = coefficients for the zero-one dummy variables expressing the influence of the United States' price freeze, the Canadian rail strike, and the season, respectively, on the intercept term,

B_8 = elasticity of pork belly stocks in Alberta and Saskatchewan expressed as a change in the quantity of pork belly stocks in Alberta and

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[1] Pork products exported are only pork products exported from Alberta and Saskatchewan to California, Idaho, Oregon, and Washington.

Saskatchewan w.r.t. a change in the quantity of pork bellies exported,

B_9 = elasticity of the wholesale price spread expressed as a change in the wholesale price spread w.r.t. a change in the quantity of pork bellies exported,

B_{10} = elasticity of pork belly stocks (12/down) in Alberta and Saskatchewan expressed as a change in the quantity of pork belly stocks (12/dn) in Alberta and Saskatchewan w.r.t. a change in the quantity of 11 to 13 pound bellies exported into California,

B_{11} = elasticity of hog slaughter in California expressed as a change in the quantity of hogs slaughtered in California w.r.t. a change in the quantity of 11 to 13 pound pork bellies exported to California,

B_{12} = elasticity of the price of bacon in San Francisco expressed as a change in the price of bacon in San Francisco w.r.t. a change in the quantity of 11 to 13 pound pork bellies exported to California.[1]

Econcmic interpretation of the results *a priori* would predict positive coefficients for X_1, X_2, X_4, X_8, X_{10}, and X_{12}. An increase in the farm price spread--United States minus Canadian--will increase the value of pork products from packing firms in the United States, thus directly influencing a processing firm's demand for Canadian pork products. Furthermore, an increase in hog slaughter and total pork stocks in Alberta and Saskatchewan should depress Alberta and Saskatchewan wholesale pork prices, which in turn will increase the outward flow of pork products from Canada. An increase in the price of bacon caused by a reduction in local pork supplies will stimulate a meat processor's demand for imported pork bellies. This behavior is particularly true when the price spread between the cost of local versus imported pork supplies exceeds all transfer costs.

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[1] The supporting data for the regression equations are given in Appendix E.

Negative coefficients are predicted for X_3, X_9, and X_{11}. The demand for Canadian pork products by meat processors in the Pacific region should vary inversely with the number of hogs slaughtered in the United States. Furthermore, it is hypothesized that a meat processor's demand for Canadian eleven to thirteen pound pork bellies is inversely related to the Canadian minus U.S. wholesale price. A California meat processor's demand for Canadian pork bellies should decline when the number of hogs slaughtered in California increases.

The United States' price freeze placed a price ceiling on commodities manufactured from domestic produce at the retail level only. The price ceiling, however, did not include imported commodities. Consequently, the demand for foreign imports by meat processors who experienced little or no profit from using domestically produced factor inputs should increase. Canada's rail strike on perishable commodities may have increased meat exports from Alberta and Saskatchewan, resulting in a positive coefficient for X_6.

Finally, consumer demand for pork strengthens between July and December. Therefore, positive coefficients are predicted for the last two quarters of 1973.

The following chapter gives the empirical results of the trade-behavior models when economic data are applied to the trade functions.

CHAPTER VI

EMPIRICAL RESULTS SECURED

The formulation of empirical models allows the testing of hypotheses derived from the utilization of economic theory. In accomplishing this task, the model is subjected to a number of rigorous statistical tests that indicate the degree of confidence a researcher can place in the parameter estimates. The purpose of this chapter, then, is to present the empirical results, test the reliability of the models, and test the hypotheses formulated in Chapter I.

The Empirical Model

The regression equations resulting from the use of the ordinary least squares estimation technique and the Napier logarithmic data are given below.[1]

$$\begin{aligned}\log \hat{Y}_1 = {} & -\log \underset{(5.619)}{6.995} + \underset{(0.095)}{0.126} \log X_1 - \underset{(0.478)}{0.261} \log X_2 + \underset{(0.683)}{0.291} \log X_3 + \\ & \underset{(0.420)}{1.513^{***}} \log X_4 + \underset{(0.229)}{0.058} \log X_5 + \underset{(0.236)}{0.380} \log X_6 + \underset{(0.201)}{0.077} \log S_1 + \\ & \underset{(0.291)}{0.095} \log S_3 - \underset{(0.199)}{0.591^{***}} \log S_4\end{aligned}$$

$$R^2 = 0.646 \qquad DW = 2.443 \qquad (1)$$

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[1] The standard errors of the regression coefficients are given in parentheses. They indicate the amounts by which the true values of the parameters may be expected to vary from the estimated values due to random error.

$$\log \hat{Y}_2 = \underset{(10.053)}{\log 8.391} + \underset{(0.193)}{0.092} \log X_1 - \underset{(0.189)}{0.272} \log X_2 - \underset{(1.351)}{0.530} \log X_3 -$$

$$\underset{(0.482)}{0.681} \log X_5 + \underset{(0.503)}{0.026} \log X_6 + \underset{(0.348)}{0.660^{*}} \log X_8 + \underset{(0.332)}{0.868^{***}} \log S_2 +$$

$$\underset{(0.555)}{0.730} \log S_3 - \underset{(0.377)}{1.039^{***}} \log S_4$$

$$R^2 = 0.395$$
$$DW = 2.321 \qquad (2)$$

$$\log \hat{Y}_3 = \underset{(9.156)}{\log 13.597} - \underset{(0.628)}{1.854^{***}} \log X_2 - \underset{(0.868)}{0.093} \log X_3 + \underset{(0.255)}{0.028} \log X_5 -$$

$$\underset{(0.137)}{0.311^{**}} \log X_9 + \underset{(0.158)}{0.382^{**}} \log X_{10} + \underset{(0.604)}{0.273} \log X_{11} - \underset{(1.419)}{0.808} \log X_{12} +$$

$$\underset{(0.204)}{0.448^{**}} \log S_2 - \underset{(0.204)}{0.448^{**}} \log S_1 - \underset{(0.225)}{0.630^{***}} \log S_4$$

$$R^2 = 0.498$$
$$DW = 1.818 \qquad (3)$$

Observation of the results indicates that the sign of the variable X_2 (hog slaughter in Alberta and Saskatchewan lagged one week) does not correspond with expected economic interpretation in all equations. A priori reasoning would indicate that as hog marketings increase in Alberta and Saskatchewan, either product enters storage or Canadian suppliers give purchasing discounts to customers in alternative markets for volume orders. Furthermore, the demand for pork products by a meat processor in the Pacific region may be influenced more by the demand of his clientele than by available supplies from his supplier.

The sign of the parameter estimate for hog slaughter in the United States lagged one week does not conform to a priori reasoning in Equation (1). Total hog slaughter in the U.S. may be a poor proxy for measuring the influence of meat suppliers in the United States on altering the amount of Canadian pork exports into the Pacific region. Instead, only hog marketings in the pork surplus states should have been incorporated as an explanatory variable. Except for X_5 in Equation (2), the signs of the variables X_5 and X_6 (U.S. price freeze and Canadian rail strike, respectively) conform with expected economic interpretation. The demand of meat processors in the Pacific region for Canadian pork bellies was influenced more by seasonal demand than by the U.S. government retail price freeze.

The signs of the parameter estimates for the variables X_1 (U.S. minus Canadian farm price), X_9 (Canadian minus the United States wholesale price of eleven to thirteen pound bellies), and X_4, X_8, and X_{10} (pork stocks in Alberta and Saskatchewan lagged one week) correspond with the expected economic interpretation. The parameter signs for X_{12} (the retail price of bacon in California lagged one week) and for hog slaughter in California lagged one week (X_{11}), however, do not conform to a priori expectations. The majority of live hogs in California are slaughtered at Los Angeles. Conversely, meat processors in Northern California are the major customers for eleven to thirteen pound pork bellies from Alberta and Saskatchewan. Since pork products manufactured from hogs slaughtered in California are primarily marketed in Southern California, the opposite sign of the parameter estimate (X_{11}) is not surprising.

Observation of the sign of the parameters for seasonality using zero-one dummy variables indicates that the demand for pork products from Alberta and Saskatchewan by meat processors in the Pacific region weakened during the fourth quarter. This could be a reflection of a stronger demand for pork by Canadian consumers in the latter part of the year, accounting for the negative, instead of the expected positive, coefficient. A similar result was found for quarter one in Equation (3). Conversely, the demand by meat processors in the Pacific region for pork products from the Canadian Prairies strengthened in the second and third quarters of 1973.

The significance of the parameter estimates are tested using the Student's t-test where the asterisks represent confidence levels of 99 percent (***), 95 percent (**), and 90 percent (*), secured by a two-tailed test and 50 degrees of freedom. In Equation (1), the parameter estimates for hogs slaughtered in Alberta and Saskatchewan lagged one week (X_2), and hogs slaughtered in the United States lagged one week (X_3), are not significantly different from zero at a confidence level of 70 percent. Their respective t-values were -0.546 and 0.426 compared to the table value $t(.30)(50)=1.05$. These variables should be dropped from the model or another lagged period should be considered. The parameter estimates measuring the influence of the United States price freeze and seasonal demand for quarters one, two, and three are not significantly different from zero at a confidence level of 70 percent. They should also be dropped from the model. The parameter estimates for the farm price spread (X_1) and the Canadian rail strike, however, are significantly different from zero at a confidence level of at least 80 percent, employing the Student's t-test.

The parameter estimate for the U.S. minus Canadian hog price (X_1) in Equation (2) is not significantly different from zero at a 70 percent confidence level; nor are the parameter estimates for the explanatory variables X_3 (U.S. hog slaughter) and X_6 (Canadian rail strike). Furthermore, the variation in the dependent variable is largely explained by the other variables. Therefore, variables X_1, X_3, and X_6 should be deleted from Equation (2). Except for the constant, the remaining parameter estimates in Equation (2) were significant at a confidence level of at least 80 percent.

The calculated t-values for the explanatory variables X_3 (U.S. hog slaughter), X_5 (U.S. price freeze), X_{11} (California hog slaughter), and X_{12} (bacon price) in Equation (3) are less than 0.60. These variables contribute little to the explanation of imports of eleven to thirteen pound pork bellies from Alberta and Saskatchewan by meat processors in California and should be deleted from Equation (3).

Another statistical test used to validate the results is the F-test. This test indicates the level of confidence which can be placed in the independent variables, explaining the variability in the dependent variable.[1] The null hypothesis $H_0(R^2=0)$ that no statistical relationship exists between the dependent (Y) and explanatory (X) variablesis formulated. Consulting the tables of F-distribution, it is found that the F-values at the 95 percent confidence level for Equations (1), (2), and (3) are 2.07, 2.07, and 2.04, respectively. The respective calculated values are 8.00, 2.68, and 3.62. Since $F_C > F_T$ for all equations, the null hypothesis $(R^2=0)$ is rejected and the alternative hypothesis

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[1] The F-statistic is found by dividing the explained variance by the unexplained variance. The formula is:

$$F_C = \frac{R^2/(K-1)}{(1-R^2)/(n-K)}$$

where:

F_C = the computed F-statistic,
K = the number of variables, including the dependent variables,
R^2 = coefficient of determination,
n = the number of observations.

Adopted from : W.B. Wentz, Marketing Research: Management and Methods (New York: Harper and Row, Publishers, Inc., 1972), pp.334-336.

that the variability of Y is dependent upon the variability in the independent variables at a 95 percent confidence level is accepted. Moreover, observations of the correlation matrices indicate that correlation between the explanatory variables are not significantly high (maximum of 79 percent), and small standard errors of the parameter estimates further suggest that multicollinearity is not a problem.

Finally, the Durbin-Watson test for autocorrelation (relations between the u's) is applied to the equations. The null hypothesis that the random errors of the explanatory variables are not correlated is formulated. The Durbin-Watson d-statistic, secured via the computer printout, is compared with the upper and lower table values for d. Johnston indicates that a researcher can conclude:[1]

1. Positive autocorrelation if $d < d_L$.
2. Accept null hypothesis of non-autocorrelation if $d_u < d < 4-d_u$.
3. Inconclusive autocorrelation if $d_L < d < d_u$, and $4-d_u < d < 4-d_L$.
4. Negative autocorrelation if $4-d_L < d < 4$.

The results for the three equations indicate zero autocorrelation in Equation (3) and inconclusive autocorrelation in Equations (1) and (2). Therefore, the hypothesis of non-autocorrelated u for Equation (3) is accepted, while a definite conclusion cannot be formulated for Equations (1) and (2). Table values for K=5 were extrapolated for K greater than 5.

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[1] J. Johnston, Econometric Methods (New York: McGraw-Hill Book Company, 1972), p.252.

Parameter estimates for the explanatory variables were tested using the Student's t-test. A number of postulated economic variables influencing pork exports from Alberta and Saskatchewan into the Pacific region were not significantly different from zero at a 70 percent confidence level. The deletion of these variables from the equations presents the following results:

$$\log \hat{Y}_1 = -\log \underset{(2.687)}{4.578^{*}} + \underset{(0.077)}{0.141^{*}}\, X_1 + \underset{(0.304)}{1.362^{***}}\, X_4 + \underset{(0.127)}{0.272^{**}}\, X_5 - \underset{(0.138)}{0.514^{***}}\, S_4$$

$$R^2 = 0.599$$
$$DW = 2.094 \qquad (4)$$

$$\log \hat{Y}_2 = \log \underset{(1.657)}{3.778^{**}} - \underset{(0.181)}{0.282}\, X_2 - \underset{(0.397)}{0.498}\, X_5 + \underset{(0.319)}{0.627^{**}}\, X_8 + \underset{(0.323)}{1.109^{***}} S_1 + \underset{(0.398)}{1.971^{***}}\, S_2 + \underset{(0.524)}{1.789^{***}}\, S_4$$

$$R^2 = 0.387$$
$$DW = 2.281 \qquad (5)$$

$$\log \hat{Y}_3 = \underset{(1.860)}{\log 8.886^{***}} - \underset{(0.525)}{1.681^{***}} X_2 - \underset{(0.090)}{0.404^{***}} X_9 + \underset{(0.114)}{0.397^{***}} X_{10} + \underset{(0.146)}{0.501^{***}} S_2$$

$$R^2 = 0.452$$
$$DW = 1.668 \qquad (6)$$

The equations are again submitted to the Student's t-test, F-test, and the Durbin-Watson test for autocorrelation. All parameter estimates, except for variables X_2 (hog slaughter in Alberta and Saskatchewan lagged one week) and X_5 (U.S. price freeze), are significant at a confidence level of at least 90 percent. Observing the critical regions for t, all null hypotheses that the parameter estimates equal zero are rejected in favor of alternative hypotheses that the parameter estimates are significantly different from zero (either greater than or less than zero). Furthermore, the F-statistic for each equation was significant at a 99 percent confidence level.[1] Therefore, the null hypothesis ($R^2=0$) is rejected in favor of the alternative hypothesis that the variability in the dependent variable is dependent on the variability in the explanatory variables.

The correlation matrices for the equations and small standard errors for the parameter estimates indicate that multicollinearity (interdependence between the independent variables) is not a problem in the model. The Durbin-Watson test for positive autocorrelation indicates zero autocorrelation in Equation (4). However, an inconclusive interpretation for positive autocorrelation in Equations (5) and (6) is formulated.

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[1] F_c for Equations (4), (5), and (6) were 13.78, 3.87, and 7.60, respectively. The respective F_c values were 3.44, 3.07, and 3.44.

Observation of the results indicate that the sign of the explanatory variable X_2 (hogs slaughtered in Alberta and Saskatchewan lagged one week) does not conform to expected economic interpretation. Furthermore, plotting the independent variable X_2 against the dependent variable Y_3 (eleven to thirteen pound pork bellies) does not present an identifiable positive or negative relationship between the variables. Therefore, although the Student's t-test indicated that X_2 is significant at a confidence level of 99 percent, this result should be accepted only if there is supporting information or if a great deal of caution is exercised by the reader. The signs of the parameter estimates for the other exogenous variables correspond with expected economic interpretation.

Hypotheses Testing

Employing the results obtained from the regression equations, the hypotheses defined in Chapter I can be tested. The first hypothesis states that the farm price spread for hogs between Canada and the United States influences the flow of Canadian pork products into the Pacific region of the United States. Examining Equation (4), it is observed that the quantity of pork exported from Alberta and Saskatchewan into the Pacific region responds directly to a change in the United States minus Canadian hog price. More precisely, a 10 percent change in the farm price spread will cause a 1.41 percent change in the volume of pork products exported from Alberta and Saskatchewan into the Pacific region. Therefore, the first hypothesis is accepted.

The second hypothesis states that the price spread for pork cuts between alternative markets is a major factor influencing the purchasing behavior of meat processors in California. Observing variable X_9 in Equation (6), it is observed that a meat processor's demand for eleven to thirteen pound pork bellies is inversely related to the Canadian minus U.S. wholesale price. A 10 percent change in the wholesale price spread for eleven to thirteen pound pork bellies will cause a 4 percent change in a meat processor's demand. Therefore, the second hypothesis is also accepted. Furthermore, it is interesting to note that a meat processor's demand for Canadian eleven to thirteen pound pork bellies over their U.S. counterpart is inelastic. This means that Canadian packing firms could increase their total revenue through price increases. The percent change in price would more than compensate for the decline in sales.

The third hypothesis states that hog slaughter in Alberta and Saskatchewan directly influences the flow of pork products into California. The parameter estimate for this variable (X_2) was not significant at the 70 percent confidence level in Equation (4), and the parameter signs were opposite to the expected economic interpretation in Equations (5) and (6). Therefore, the third hypothesis is rejected.

The fourth hypothesis was that hog slaughter in the United States inversely alters the flow of pork products from Alberta and Saskatchewan into the Pacific region. Empirical evidence indicated the explanatory variable X_3 was not a significant variable in explaining pork exports from Alberta and Saskatchewan into the Pacific region. Thus, the fourth hypothesis was rejected.

The fifth hypothesis which states that the flow of pork products from Alberta and Saskatchewan into California is directly related to retail pork prices in California, is also rejected. The price of bacon (X_{12}) was used as an independent variable explaining the flow of eleven to thirteen pound pork bellies into California. However, the parameter estimate using the Student's t-test was not significant at the 70 percent confidence level. Therefore, it was dropped from the final equation.

The final hypothesis was that pork stocks in Alberta and Saskatchewan directly influenced the flow of pork products from Alberta and Saskatchewan into the Pacific region. Examining the variable X_4 (total pork stocks lagged one week) in Equation (4), a positive relationship between pork stocks and pork exports from Alberta and Saskatchewan is observed. A 10 percent increase in pork stocks in Alberta and Saskatchewan will result in a 13.62 percent increase in pork exports to the Pacific region. The exogenous variables X_8 (pork belly stocks lagged one week) in Equation (5) and X_{10} (pork belly stocks 12/down lagged one week) in Equation (6) further support the hypothesis. A 10 percent change in total pork belly stocks in Equation (5), will cause the exports of pork bellies from Alberta and Saskatchewan into the Pacific region to change by 6.27 percent. Moreover, a 10 percent increase in pork belly stocks 12/down in Equation (6), will cause a 3.97 percent increase in the exports of eleven to thirteen pound pork bellies from Alberta and Saskatchewan into California. Therefore, the final hypothesis is accepted.

The level of confidence that can be placed in a specified econometric model is tested utilizing the Student's t-test and the F-statistic. The parameter estimates of a number of independent variables were significantly different from zero at a confidence level of at least 90 percent. At a confidence level of 99 percent the F-statistic for all equations further suggests that the variability in the dependent variable Y is dependent upon the variability in the explanatory variables. However, the independent variables--United States minus Canadian farm price (X_1), pork stocks (X_4, X_8, and X_{10}), United States' price freeze (X_5), Canadian minus United States' wholesale price for eleven to thirteen pound pork bellies (X_9), hog slaughter in Alberta and Saskatchewan (X_2), and season (S_1, ..., S_4)--do not explain 100 percent of the variation in the dependent variables--volume of pork shipped (Y_1), volume of pork bellies shipped (Y_2), and volume of eleven to thirteen pound pork bellies shipped into California (Y_3). Other factors, such as product quality, reliability of supplies, conditions of sale, product uniformity, and meat inspection, are important considerations. Unfortunately, these variables cannot be quantified, restricting their addition to an econometric model using time series data. On the other hand, personal interviews with meat processors in the Pacific region alleviates the problem of quantifying these variables. Personal communication with meat processors, wholesalers, retailers, meat jobbers, and meat brokers in the Pacific region can isolate which market criteria are important when a manager is purchasing meat products. The influence of the latter variables on restricting trade between meat packing plants in Alberta and Saskatchewan and firms engaged in purchasing, processing, and selling meat products in the Pacific region can be recorded, emphasizing the purchaser's position in the marketing channel. The responses from the personal interview schedule provide a cross-reference system and either support or refute the empirical results.

Chapter VII aggregates responses obtained from the personal interviews held with members associated with the meat industry in the Pacific region. The region is separated into Northern California, Southern California, and Idaho, Oregon, and Washington.

CHAPTER VII

CANADIAN PORK IN THE PACIFIC REGION

The identification of the wants and desires of potential clientele is a viable market penetration strategy. Once identified, a supplier can provide a commodity in the proper place, at the proper time, and in the proper form.

In isolating problems inherent in the marketing channel between Canadian packing plants and members of the meat industry in the Pacific region, personal unstructured interviews with meat processors, meat brokers, meat jobbers, packing plant managers, wholesalers, and retailers were conducted.[1]

The interviews concentrated on exchange (buying and selling), physical (storage, transportation, and processing), and facilitating (standardization, financing, risk-bearing, and market intelligence) marketing processes. The responses to the personal interview schedules by members of the meat industry in three regions--Northern California, Southern California, and Idaho, Oregon, and Washington--are aggregated.

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[1] Appendix F gives a table of individuals interviewed, by category, in the three regions.

The purpose of this chapter is to evaluate the influence of marketing processes on meat purchasers, processors, and sellers in the Pacific region when handling pork products from Canada. At the same time, the concept of contracting a stable supply is evaluated.

Exchange Functions

The activities involved in the transfer of title of goods are exchange functions. They involve the buying and selling of a commodity.

The buying function involves searching for sources of supply and completing activities associated with the purchase of a commodity. Conversely, a firm's activities to influence or create demand are part of the selling function. It involves various merchandising techniques such as the display of goods, advertising, and other promotional activities. Further, the method of packaging, unit of sale, customer contact, and servicing of accounts are selling considerations.[1]

The meat institution in Northern California has shifted from hog slaughtering to specialized meat processing. A single hog slaughtering plant with an estimated weekly kill of 5,500 to 6,000 hogs is operating in the San Francisco region. Local hogs plus truck inshipments from other U.S. regions constitute the source of supply.

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[1] R.L.Kohls and W.D.Downey, Marketing of Agricultural Products (New York: The MacMillan Company, 1972).

Local pork supplies in Northern California are insufficient to satisfy the demand of meat processors for fresh and frozen pork. Pork imports from U.S. regions and/or foreign countries are required. The majority of Canadian pork products are purchased through meat brokers. The meat broker gives price quotes to Californian meat processors in U.S. funds, duty paid, f.o.b. the purchaser's plant. In addition to his normal service, the broker completes arrangements for product assembly, transportation, and product delivery.

Through the interviews a number of meat processors indicated that two factors were important when purchasing pork cuts: (1) price and (2) yield. Although price was the most important decision variable, meat manufacturers are becoming increasingly conscious of fat content in pork cuts and trimmings. More sophisticated techniques of chemical analysis and least-cost product formulation are being used to determine lean content. Purchasers require a minimum guaranteed lean content of 72 percent. As one purchaser states:

> Price is the basis for our source of supply. Yield levels of a product are a second consideration. The usual guarantee is 28 percent fat, even from

> suppliers who habitually have lower fat contents. Picnics are usually 25 percent fat. Our firm would pay a premium of 1/2 cent per pound, per 1 percent lean content above 72 percent. The lean content would have to be guaranteed.

Another meat processor stated that he would pay a 3 cent per pound premium for pork products containing a 20 percent maximum fat content.

Other meat processors in Northern California, however, indicated that they would purchase all Canadian product at a premium of 2 to 3 cents per pound over price quotes from the Mid-Western packers. Their views are expressed as follows:

> We like Canadian pork. It is leaner, has a consistent yield, but we need more of it. If we are going to satisfy our customers and expand our accounts, we need a continuous dependable supply. Canadian packing firms have not filled commitments many times. This hurts our reputation as a supplier as well. Although we prefer and pay a premium for Canadian pork products, our supply is guaranteed only by purchasing product from alternative markets.

A single hog slaughtering plant, "Farmer John's", is operating in Southern California. The firm slaughters approximately 25,000 hogs per week and employs 25 buyers stationed throughout the Mid-Western United States. Hog inshipments from the Mid-Western states, using triple decked rail cars, are the plant's major supply source.

The majority of Southern Californian firms in the meat processing industry have shifted away from hog slaughtering into fabricating carcasses. They prefer carcasses weighing 171 to 193 pounds, equivalent to a 200 to 247 pound live hog, using a 78 percent conversion ratio.

Hog carcasses are mainly purchased from Mid-Western packing firms. A Californian firm fabricating hog carcasses has a supply contract with a Mid-Western packing firm. A weekly volume is guaranteed. For additional carcass deliveries the supplier is notified one week in advance. An average weekly price utilizing the 'Yellow Sheet' establishes the purchase price.[1]

Arrangements to purchase hog carcasses from Canada have been either direct or through meat brokers. Although meat managers are satisfied with the yield of Canadian hog carcasses, they are not interested in paying a premium. Price is the number one consideration.

In many cases, managers and/or entrepreneurs of hog slaughtering, carcass fabricating, and specialty meat processing firms in Idaho, Oregon, and Washington were price sensitive. Entrepreneurs indicated that normally local supplies were adequate for their operations. Local hogs are purchased through auction markets and/or personal negotiations with producers. One manager felt that purchasing hogs directly from hog producers was cheaper. When necessary, hog inshipments from Montana, the Mid-Western states, and Canada supplement local supplies. Plant managers contact regional suppliers for a price quote. Before a purchase is confirmed, price adjustments for each region are made allowing for differences in estimated hog yields.

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[1] The 'Yellow Sheet' refers to The National Provisioner, a daily market and news service providing livestock and wholesale price quotes--Chicago basis. Available from 15 West Huron Street, Chicago, Illinois.

Regardless of where hogs were purchased, price was the most important factor. One vertically integrated firm indicated that at present, local supplies were adequate to satisfy demand. However, should business expand: "The decision to purchase live hogs or pork products from Canada would be based entirely upon price."

Although in several cases product price was the most important factor influencing the manager's decisions, it was not so with others. Product yield and additional trimming costs, particularly when purchasing pork bellies, were more important factors. As one entrepreneur said:

> If we buy a product for 5 cents per pound cheaper, it could end up being that much more expensive because of product loss and trimming costs. Canadian bellies are leaner and yield better than bellies from the United States. Canadian bellies usually cost more, but they are worth it.

A meat merchandising manager for 118 retail outlets in this region had the same opinion. He will pay an 8 cent per pound premium over the 'Yellow Sheet' price for quality pork products. Pork accounts for approximately 30 percent of his meat volume.

Customers of meat processors in Northern California are contacted by salesmen and/or the processing firm's manager. Once an account is established, the customer usually places orders with the processor. As one manager states:

> I have three salesmen in the field who service old accounts and approach new customers. Once an account is established, I receive orders one or two days in advance, and use trucking vans to make customer deliveries.

Most meat processors have never promoted Canadian pork products. They feel that the inconsistent supply and insufficient volume does not justify a promotional campaign. One firm, however, has promoted Canadian superiority in slab bacon to the hotel, restaurant, and institutional (HRI) trade with excellent response. This firm's clientele pay a premium for Canadian slab bacon.

A San Francisco firm manufacturing sausage and bacon advertises its branded products, particularly sliced bacon, extensively. The company controls more than 20 percent of the sliced bacon market in San Francisco.[1] Other firms, however, package processed products for various retailers who then advertise their brand names.

Firms fabricating hog carcasses in Southern California sell direct to retail outlets. One firm has a monthly supply commitment with a retailer. A formula based on Friday average prices for the month establishes the price of the product.

The majority of pork cuts are marketed fresh. As one manager stated: "We attempt to have a rapid turnover of fresh product--as fast as possible, usually in a few days or hours".

The fresh product is boxed with carbon dioxide pellets and is shipped to retail outlets. Meat processors have discovered that the product arrives in excellent condition, retains its bloom, and has an extended shelf life of five to six days when carbon dioxide pellets are used.

Firms have effectively developed brand names for their products in Southern California. Pork products of one firm slaughtering and processing hogs have become a well-known household word. An industry representative estimates that their firm's pork products receive a 2 cent per pound premium over local competitor brands. Further, brand loyalty for processed products on the part of consumers will withstand considerable price differentials. Consumer response for Burns back bacon has been excellent. Sales have been maintained even when the product is more expensive than its U.S. counterparts.

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[1] A consumer's decision to buy bacon was more than a price decision. A two-pound package of this firm's sliced bacon sold for $2.11, while the packaged bacon of three competitors sold in the same retail outlet for $1.04, $1.07, and $1.06 per pound.

Canadian pork products in the fresh state have not been promoted to the Californian consumer. Consistency of supply has been the problem. However, if Canadian firms were willing to enter a supply commitment, one firm would promote Canadian pork. The firm was very interested in developing, through their retail stores, a "Buy Canadian" program.

American consumers in the Washington and Oregon have been receptive to Canadian pork products. One retailer was purchasing and marketing Canadian cryovac hams in the two to three pound category under a Canadian brand name. Consumer response was excellent. Price increases, however, forced him to temporarily discontinue the product line.

At the same time, a major retailer was interested in promoting fresh Canadian pork at the meat counter with some in-store promotion. The Canadian products would have to be priced competitively. The retail meat manager was also interested in developing a Canadian brand name. At present, local meat packing companies give a 2 cent per pound discount on all purchases if a promotional campaign is maintained for an entire month.

An innovation from the traditional meat brokerage operation to a menu marketing system has been undertaken by one firm. The firm purchases portion control cuts for their clientele, who specialize in custom prepared foods for the institutional food service industry. A member of the brokerage company accompanies the firm's salesman on his calls to assist in completing satisfactory menus. The representative from the brokerage firm assists by providing additional information regarding the quality of the menu ingredients.

Physical Functions

Physical functions are those activities involved in handling and altering the form of a commodity . The three physical functions are storage, transportation, and processing. They make the goods available at the proper time, at the proper place, and in the proper form.[1]

An Edmonton trucking firm transports the majority of pork products from Alberta and Saskatchewan to California.[2]

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[1] *Ibid*., p.21.

[2] The distribution of pork products from Alberta into San Francisco is documented in Appendix G.

The firm received a U.S. trucking license authorizing shipments into California from the Interstate Commerce Commission in 1971.

Meat processors in the Pacific region have received excellent service. The shipments arrive on time with the product in excellent condition. Furthermore, their fee of $2.50 per hundredweight (cwt) is competitive with truckers from the Mid-West, who charge $2.50 to $3.00 per cwt.[1] A comparable rail rate from South Dakota is $2.10 per cwt. The capacity of a rail car is 75,000 pounds as opposed to 38,000 to 40,000 pounds for truck couriers. Comparing rail with truck freight intervals, product inshipments from the Mid-Western states to California are 144 hours and 51 hours, respectively. Meat products are delivered in 48 hours from Alberta.

Entrepreneurs with meat fabricating plants in Southern California use rented and/or owned truck couriers for carcass inshipments. Pork sides purchased from Mid-Western packing companies are shipped Friday afternoon for warehouse delivery Sunday. The sides are fabricated and distributed to retail stores on Monday, Tuesday, and Wednesday. A second shipment arrives on Wednesday for store distribution on Thursday and Friday.

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[1] Effective August 11, 1974, the firm's transportation rates are increasing approximately $0.60 per cwt. Canadian packing firms demand daily service comparable to domestic carriers. However, sporadic fluctuations of meat sales to meat processors in the Pacific region create a very poor utilization of the transport equipment, forcing an upward adjustment in their freight rates.

Limited meat storage facilities in the Pacific region has not been an impediment to Canadian meat exporters. California meat manufacturers have their own freezer space up to a capacity of 500,000 pounds. Additional cold storage space can be rented. On April 30,1974, the usable cold storage space for rent in California public warehouses was 11.46 million cubic feet and 48.52 million cubic feet for cooler and freezer space, respectively.[1] Fifty-three percent of the cooler space and 69 percent of the freezer space was occupied at the time. During tha same period, 50 percent of the public freezer space and less than 60 percent of the available public cooler space was occupied in Washington and Oregon. Furthermore, the development of an efficient service system for distributing fresh meat products directly to retail outlets reduces the demand for public cooler and freezer space.

Facilitating Functions

Standardization and grading, financing, risk bearing, and market information are the facilitating functions.[1] These activities are necessary for the smooth performance of the exchange and physical functions. They are not directly involved in either the title transfer or the physical distribution of goods. Standardization and grading have become an important marketing activity. The trading of a commodity in well-defined units of quality and quantity allows the establishment of effective price quotes. Standardization also simplifies the aggregation of a commodity for shipment. Furthermore, storage costs can be reduced through efficient utilization of storage space.

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[1] United States Department of Agriculture, *Cold Storage* (Washington, D.C.: U.S.D.A., Statistical Reporting Service, Crop Reporting Board, April, 1974).

Meat processors in the Pacific region had few complaints regarding Canadian pork. Canadian pork cuts are uniform and of superb quality. Canadian butts and picnics are extremely lean, well trimmed, and retain excellent bloom. Moreover, Canadian bellies yield 5 percent more than bellies purchased from the River States. One processor refuses to purchase pork cuts from some Mid-Western suppliers because of their poor quality.

Firms fabricating Canadian hog carcasses are generally satisfied with the yield of Canadian hogs. Canadian hogs are lean and produce a uniform product. The demand of the American consumer has shifted toward lean bacon, which places Canadian pork in a favorable position in the bacon market. An industry complaint of Canadian product, however, was the fact that loins were too light relative to retailers' expectations. This leads to a number of interesting questions regarding the marketing of hogs in Canada. If consumers in California are demanding heavier loins, then what about Canadian consumers? Should Canada's hog grading system be adjusted upwards to compensate for the demand for heavier cuts?

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[1] T.N.Beckman and W.R.Davidson, Marketing (New York: The Ronald Press Company, 1967).

The financing function allows the extension of credit to customers who perform various aspects of marketing, and is necessary anywhere that storage or delays take place. Several financial arrangements between Canadian packing plants and meat processors in the Pacific region are practised. Credit arrangements for most accounts are seven to ten days net, with an odd thirty day account. The response of one processor regarding financial arrangements was:

> Supply has been more of a problem than financial arrangements. Our firm has cooler and freezer facilities that allow volume purchasing. We are presently carrying approximately $200,000 worth of inventories, with a three month turnover. Purchasing discounts are given on volume orders, which justifies maintenance of high inventories. Another benefit is that our company receives a 1 percent discount if accounts are paid within ten days after shipment. We extend thirty days credit to our customers.

Cash on delivery (C.O.D.) billings have caused customers inconvenience when they did not receive advance notice of a C.O.D. shipment. Requests for a bank draft and C.O.D. billings by Canadian packing plants have caused several plant managers to decide not to purchase Canadian products. Improved financial arrangements with customers requiring bank drafts or C.O.D. billing would facilitate Canada's pork trade in this region.

A manufacturer may suffer a loss in marketing a product through physical or market risks. Physical risks may occur through the destruction or deterioration of a commodity before a purchaser receives, processes, and redistributes the product. They may occur because of an accident or weather catastrophy. Market risks occur from changes in the value of a product before it can be processed or marketed. A change in consumer tastes or the activity of a competitor may cause losses in a firm's market share. Market risks may be borne by an entrepreneur, or shifted to more conventional forms. Insurance companies provide an outlet for physical risks, while futures exchanges are utilized to shift price risks to market speculators.[1] Physical risks that occur from the destruction or deterioration of meat products are minimal. Reiffers are installed on truck trailers and rail cars for refrigeration. Moreover, the use of carbon dioxide pellets has been an improvement in extending the shelf life of fresh meat products.

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[1] R.L.Kohls and W.D.Downey, op. cit., P.22.

Meat inspection by the United States Department of Agriculture (U.S.D.A.) is the greatest risk. Although less than 1 percent of Alberta and Saskatchewan pork exports into the Pacific region are rejected by U.S.D.A. meat inspection at Great Falls, the smooth flow of pork products is disrupted. Recently 30,000 pounds of Canadian pork skins were rejected by U.S.D.A. inspectors in Oakland because of root hairs. The load was not inspected at the border, but delivered to a public cold storage warehouse. The relative cost of storage and handling was high compared to product value. Consequently, the product was creosoted to prevent selling and was then dumped.

Managers importing hog carcasses from Canada indicated that U.S.D.A. meat inspection has not been a problem. Trucking firms from the United States are marked with a U.S.D.A. seal allowing meat inspection at a purchaser's plant. A one hour delay at the border occurs while the side and rear doors of the trailer are opened for visual inspection of the carcasses. Moreover, at destination, U.S.D.A. inspectors, instead of rejecting the load because of dirt or minor difficulties, have allowed carcass cleaning.

Market risks are those that occur as a result of a change in the value of a product as it is marketed. An unfavorable shift in the exchange rate or product price might cause heavy inventory losses.

Meat processors in the Pacific region receive a price quote in U.S. dollars, duty paid, f.o.b. his plant. The Canadian packing plant absorbs changes in the exchange rate between the Canadian and the U.S. dollar, and pays duty on United States pork imports.[1]

Although meat manufacturers purchasing Canadian pork products are insulated against exchange rate adjustments, the possibility of unfavorable price movements is an unavoidable market risk. Hedging existing inventories and/or future supplies on the futures exchange is one method of minimizing price risks. Live hogs, frozen skinned hams, and pork belly contracts are offered by the Chicago Mercantile Exchange. Meat manufacturers interviewed in Northern California have never used, nor intend to use, the futures market for speculation or hedging. Furthermore, of the people interviewed in Southern California, only one used the Chicago futures exchange. He was not interested in hedging but speculated on storage stocks near Christmas.

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[1] On January 1, 1972, U.S. tariffs on Canadian pork imports were 0.5 ¢ /lb. on fresh frozen product, 2 ¢ /lb. on processed bone in, and 3 ¢ /lb. on boneless pork products.

Continuity of supply from Canadian packing plants to meat processors in the study area is the major market penetration problem. Developing forward contracts between the supplier and the meat manufacturer would alleviate this problem.

The responses of industry members to Alberta's proposed forward contracting scheme were mixed. A number were skeptical, rejecting the idea immediately because: "We're operating in a cash market. If one priced 1/4 cent above his competition, he would lose his market." Another manager states: "I'm scared of forward contracts because of the day-to-day pricing of finished product. I'm more interested in remaining and buying on a competitive market, than buying at a stable price."

The attitude of retail firms and institutions toward forward contracting of supplies regulates how fast the meat industry will shift from the traditional day-to-day selling mechanism. A bacon manufacturer would contract his belly supply if retailers would contract his production. Another manufacturer would sell salami to the chain stores on a ninety day contract. Although a major retailer in Southern California sympathized with the fact that producers may need a contract as an incentive to produce, his firm was not interested in forward contracting. He stated : "If you develop a demand for a product, then the contract is unnecessary--you buy what you need every week." Another industry member indicated that the present system allowed for purchasing flexibility. He weighs one market against another, when he buys supplies for the next week.

The possibility of acceptance of any forward contracting scheme by members of the meat industry in Southern California can be summed up as follows: "Incentives to change from the present system would have to be based on hard dollars and long term benefits."

Managers of firms slaughtering live hogs, fabricating carcasses, and distributing pork products on a week-to-week basis were not interested in exploring the concept of forward contracting. However, entrepreneurs manufacturing specialty items and portion control cuts were willing to negotiate supply contracts. One manager's reaction was: "Forward contracting could be a solution to the tremendous fluctuation in prices we have experienced in the last two years." Another manager stated:

> The price of a commodity is of minor importance. Our major concern is contracting with a processing firm that will guarantee product quality and a reliable supply. We are contracting vegetables up to three months in advance, and we see no reason why a one year contract for meat products cannot be made.

At present, one sausage manufacturer has entered a forward contract with a Mid-Western packing company for a portion of his supply. Price quotes from the 'Yellow Sheet' formulate the base price. A final price is determined by implementing a prearranged adjustment formula.

Meat manufacturers who pre-price the finished product with their clientele--bacon, sausage, and salami manufacturers--are particularly interested in forward contracting. Managers were receptive to one or more of the following contractual arrangements:

(1) A stable supply priced relative to the U.S. market, with up to a 7 cent per pound premium.

(2) A supply contract at open or average prices.

(3) A supply contract tied to 'Yellow Sheet' quotes, plus a formula adjustment.

It is interesting to note that a wholesale cooperative, operating for 2,500 independent members in California, is purchasing turkeys six months in advance. The cooperative is guaranteed a supply for a negotiated price. Market risks are eliminated by a clause within the contract. The clause stipulates that the supplier will honor the contract price on the delivery date if the market price exceeds the contract price. Conversely, all price declines below the contract price are passed on to the cooperative. This arrangement has been operational for three years.

The collection and dissemination of marketing information is necessary for the smooth operation of the marketing processes. Efficient price establishment cannot occur without adequate information concerning the sources of supply, consumer demand, government policies, and other market conditions. Financial arrangements, transportation service, storage facilities, and product characteristics must be considered by the purchaser and seller before an agreement is reached. Often the success of a business is attributed to the entrepreneur's ability to analyse factual information. Firm survival is enhanced by detailed and current market information.[1]

Most manufacturers in the Pacific region rely on meat brokers for recent market information. The majority of people interviewed found the service satisfactory. Certain meat manufacturers received information on Canadian pork products on a regular basis. Others claimed they received no information regarding available pork supplies or product prices from Canada. They would be interested in communicating with a Canadian broker for specific information.

Implications for Market Penetration

Continuity of supply from Canadian packing plants is the most serious problem. Canadian packing firms have used the Pacific region as an opportunity market for surplus product. The quality and yield of pork products from Canadian suppliers is very acceptable but before a premium can be established, supplies are discontinued. The Californian consumer demands a fresh product. Meat retailers in California have never merchandised fresh Canadian pork in their stores. Advertising brand names has been effective; however, before meat managers would merchandise pork products under a Canadian brand name, supplies would have to be guaranteed fifty-two weeks of the year.

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[1] R.L.Kohls and W.D.Downey, op. cit., pp.22-23.

An efficient transportation system between packing plants in Alberta and Saskatchewan and meat processors in the study area does exist. Public warehouse facilities for storing meat are also adequate. U.S.D.A. meat inspection at Great Falls, Montana, however, delays product delivery to meat processors and creates uncertainty in the marketing channel. U.S.D.A. meat inspection at point of lading would alleviate this problem.

C.O.D. billing and requests for bank drafts by Canadian packing plants has impeded Canada's pork trade with a number of meat processing firms in the Pacific region. A system of market intelligence specifying the history of a firm, and thus improving credit arrangements and trade, should be considered.

The failure of Canadian packing firms to offer all pork cuts is another market penetration problem. Meat processors are interested in the quality of fresh pork backs and hams from Canadian suppliers. They want offers of fresh, skinless seventeen to twenty pound or larger hams delivered in combo bins.

The concept of forward contracting was unattractive to a number of meat managers interviewed, while others were very receptive to the idea. Managers manufacturing sausage and salami would be willing to contract a portion of their supplies. A potential in this market for contracting portion control cuts and pork bellies is also available.

CHAPTER VIII

SUMMARY, CONCLUSIONS, IMPLICATIONS FOR MARKET PENETRATION AND RECOMMENDATIONS FOR FURTHER RESEARCH

Summary

Three behavioral-trade equations were analyzed using weekly data for 1973. The respective endogenous variables for the equations were the flow of pork products into the Pacific region, the flow of pork bellies into the Pacific region, and the flow of eleven to thirteen pound pork bellies into California. The data were transformed into the natural logarithmic form and parameter estimates were obtained for each equation employing ordinary least squares.

The level of confidence placed in the parameter estimates was tested via the Student's t-test. The parameter estimates for the United States minus Canadian farm price, the Canadian minus United States wholesale price for eleven to thirteen pound pork bellies, and pork stocks in Alberta and Saskatchewan were significant at a confidence level of at least 90 percent. The signs of their parameter estimates conformed with *a priori* expectations.

The explanatory variables (hog slaughter in Alberta and Saskatchewan, hog slaughter in the United States, hog slaughter in California and the retail price of bacon in

California) were a poor measure for predicting pork exports from Alberta and Saskatchewan into the Pacific region.

The F-statistic for all equations was significant at a 95 percent confidence level. Neither multicollinearity or the Durbin-Watson test for autocorrelation appeared to be a problem in any equation.

The econometric model was supplemented with personal unstructured interviews with members of the meat industry in the Pacific region. Interviews concentrated on the exchange, physical and facilitating marketing processes. The concept of forward contracting all or a portion of an entrepreneur's meat supplies was also evaluated.

Conclusions and Implications for Market Penetration

The criteria which affect the flow of pork products from Alberta and Saskatchewan into the Pacific region have been analyzed in this study. The hypotheses that hog slaughter in Alberta and Saskatchewan directly influences pork exports into the Pacific region, and that hog slaughter in the United States inversely alters the flow of pork products from Alberta and Saskatchewan into the Pacific region, were rejected. The hypothesis that the flow of pork products to California is directly related to retail pork prices in California was also rejected. However, the hypotheses that pork exports from Alberta and Saskatchewan into the Pacific region are directly related to the United States minus Canadian farm price, are inversely related to the Canadian minus U.S. wholesale price and, are directly related to pork stocks in Alberta and Saskatchewan, were accepted.

A market potential for an additional 426 million pounds of pork per year could be developed in the Pacific region by 1980. The study area has both the population base and financial resources to support the consumption increase. However, if the meat industry in Alberta and Saskatchewan are going to participate in this market potential, the industry must identify and continue to monitor market conditions.

The American consumer is more affluent today than ever before. With continued affluence, the diet shifts from a carbohydrate to a protein base and is accompanied by a quest for improved quality and diet variety. Canadian pork products are leaner than their United States counterparts and are very acceptable to meat processors in the Pacific region. However, if Canadian packing firms wish to capitalize on their favorable position in servicing this market, solving the problem of continuity of supply is paramount. Canadian packing firms have used the pacific region as an opportunity market for surplus product. In doing so, their credibility as a reliable supplier of fresh and frozen pork products has deteriorated.

Product differentation and the development of brand loyalty through advertising has been successful in the study area. Fresh pork from Canada has never been promoted under a Canadian brand name by meat retailers in California. One meat retailer was interested in developing Canadian brand names through his retail chain. Canadian packing firms, however, must first guarantee supplies fifty-two weeks of the year.

Specialty meat processors would enter forward supply contracts under various sale agreements with Canadian packing firms. The supplier would have to guarantee a weekly volume and the lean content of the products. The concept of forward contracting is also acceptable to firms catering to the HRI trade. A market for portion control cuts has remained virtually untouched. More North American housewives are working and less time is spent preparing food. Meat merchandizing and processing should respond to the shift in consumer demand. The demand for convenience food items, canned products, portion control cuts for outside barbecuing and the HRI trade, and meat cuts for take-out centers will continue to grow in the Pacific region.

Collection and dissemination of market information regarding pork supplies in Canada, meat storage facilities in the study area and transportation of meat products from Alberta into the Pacific region are not trade impediments. The service provided by Canadian meat transporters is comparable with the truck courier service from the Mid-Western states.

C.O.D. billing and requests for bank drafts by Canadian packing firms has impeded Canada's pork trade with a number of meat processing firms in the Pacific region. Improved credit arrangements with these firms would increase Canada's pork exports into the study area.

U.S.D.A. meat inspection in Great Falls, Montana, delays product delivery, increases product handling and creates uncertainty in the marketing channel. Cardboard boxes packed with mixed meat loads are walked on and often torn. Not only would U.S.D.A. inspection at point of lading alleviate this problem, but product delays and market uncertainties would be minimized.

The Pacific region provides a market potential for expanding Canada's pork exports. Canada's Prairies have the productive resources to capture this potential. Realizing the existence of a market potential and exploiting a market opportunity, however, are separate accomplishments. Realization develops from research and observation. Capturing a market potential requires the coordination of the production, processing, and marketing activities.

Even within a firm, the coordination of the production, processing, and marketing activities is not an easy task. The problem is intensified when different organizations are involved. Incentives for a consistent and 'reasonable' rate of return on investment for participating members must be available. The latter can occur only through improved communication and cooperation between participating organizations.

Increasing Canada's market share as a supplier of pork for the Pacific region requires the cooperation of producer groups, hog slaughtering and processing firms, and marketing agencies. A portion of Prairie hog production could be designated as supply for the Pacific region. After customers in the Pacific region are contacted, product specification, financial arrangements, product delivery, volume, price establishment, and other contractual criteria would be formulated. A supply contractual commitment with processors in the Pacific region is then coordinated with hog production in Alberta and Saskatchewan.

Achieving a goal such as this would require the participation of sincere, dedicated people. Although periods of skepticism will undoubtedly prevail, problems within the marketing channel can and will be overcome. Market obstruction necessitates a period of thought where marketing problems are isolated and defined. Well defined problems complemented with participant flexibility and imagination in choosing alternative courses of action create a formidable opposition. Objectives least likely to succeed will be attained through optimism and participant cooperation.

Recommendations For Further Research

The research conducted in this study forms the foundation for further areas of investigation.

Several entrepreneurs purchasing meat products in the Pacific region are interested in forward contracting all or a portion of their supplies. Specifying an acceptable contractual arrangement between the buyer and seller would be both a beneficial and challenging project.

U.S.D.A. inspection in the United States presently delays meat shipments in transit and creates uncertainty in the marketing channel. If supply contracts between packing plants in Alberta and Saskatchewan and meat processors in the Pacific region are established and accelerate, the effect of U.S.D.A. meat inspection as a trade impediment should be evaluated.

International exchange rates are constantly under adjustment. An appreciation of the Canadian dollar alters Canada's comparative advantage in servicing a foreign market. Unless an intermediary in the marketing channel absorbs an unfavorable adjustment in currency, the cost of Canadian products for a foreign importer will increase. An industry's exports may decline, depending on the relative adjustments in the exchange rate. The degree that pork exports from Alberta and Saskatchewan into the study area are altered because of exchange rate adjustments should be investigated. The research could concentrate on discovering a critical differential in the Canadian-United States exchange rate that will depress Canada's pork exports to the United States.

The cost of meat cutters in Canada are lower than in the United States. Are fixed and other variable costs also lower? The benefit of knowing the comparative advantage for processing meat products in Canadian processing firms rather than in packing plants in the Pacific region, although a formidable objective, becomes obvious.

A market for exporting live hogs to the Pacific region is available. Exporting raw materials normally contributes little toward a nation's economic growth. Therefore, analyzing the economic benefit of exporting live hogs as compared to processing hogs in Canada and exporting processed pork should be undertaken.

The major Canadian hog surplus provinces are Alberta, Saskatchewan, and Manitoba. Expanding Canada's international pork trade will require the cooperation and trust of producer groups, meat packing firms and marketing agencies. The Prairie Provinces working as a team and allocating market shares for international pork contracts would strengthen Canada's negotiating position. The benefits, costs and implications of an international pork cartel within the Prairie Provinces should be evaluated.

Attempting to establish international markets without available supplies can deteriorate a nation's and/or region's credibility. Promises to deliver pork products have not been fulfilled by suppliers in the past, causing buyer resentment. A market intelligence division indicating future supplies would minimize the commitment of imaginary supplies. Thus, further research evaluating the benefit and operation of a market intelligence division in the hog industry is paramount.

The supply of hogs provides the fuel for Canada'a involvement in international pork trade. Therefore, the potential production base, producer willingness to produce hogs, incentives necessary to stimulate hog production and the producer's reaction to forward contracting are additional areas for inquiry.

The list continues to grow like the branches on a tree. Each branch should be investigated. Optimism, flexibility, cooperation and human ingenuity will be required to solve each problem, which in turn will open another area for investigative inquiry.

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APPENDICES

APPENDIX A

PARTICIPATING TEAM MEMBERS

APPENDIX A

GOVERNMENT, INDUSTRY, AND UNIVERSITY TEAM MEMBERS

Personal unstructured interviews with members of the meat industry in the Pacific region were conducted in the late spring and early summer of 1973. The Pacific region was divided into Northern California and Southern California (first industry schedule), and Idaho, Oregon, and Washington (a second mission).

Members participating in the exploratory research were:

(1) California

Mr.Jim Dawson, economist, Alberta Department of Agriculture, Edmonton.

Mr.Ernie Figol, Figol Distributors Ltd., Edmonton.

Mr.Ralph Hamlett, administrator, Alberta Department of Industry, Trade and Commerce, Los Angeles.

Dr.Murray Hawkins, professor, University of Alberta, Edmonton.

Ms.Rosemary McCormick, summer research assistant, University of Alberta, Edmonton.

Mr.Ed Schultz, manager, Alberta Hog Producers' Marketing Board, Edmonton.

Mr.Lyle Smith, team project coordinator, graduate student, University of Alberta, Edmonton.

(2) Idaho, Oregon, Washington

Mr.J.Dawson, Mr.E.Schultz, and Mr.L.Smith were members from the first mission. Additional members were:

Mr.Don Hodgson, commercial officer, Canadian Department of Industry, Trade and Commerce, Seattle.

Dr.Joe Richter, professor, University of Alberta, Edmonton.

APPENDIX B

PORK SURPLUS IN THE PRAIRIE PROVINCES, 1961-73

TABLE B.1

PORK SURPLUS IN ALBERTA, 1961-1973

	Graded Hog Carcasses	Average Cold[a] Trimmed Wt.	Total Cold Trimmed Wt.	Population	Per Capita Pork[b] Consumption	Total Consumption	Surplus
	(head)	(lbs)	('000 lbs)	('000)	(lb)	('000 lbs)	('000 lbs)
1961	1,658,694	128.5	213,142	1,332	50.3	67,000	146,142
1962	1,674,177	127.9	214,127	1,369	50.1	68,587	145,540
1963	1,350,490	128.9	174,078	1,403	50.7	71,132	102,946
1964	1,554,364	127.8	198,648	1,429	51.8	74,022	124,626
1965	1,634,390	126.9	207,404	1,450	47.9	69,455	137,949
1966	1,350,670	128.6	173,696	1,463	46.9	68,615	105,081
1967	1,562,856	129.0	201,608	1,490	53.8	80,162	121,446
1968	1,696,952	128.0	217,210	1,524	53.6	81,686	135,524
1969	1,415,524	130.0	184,018	1,559	51.9	80,912	103,105
1970	1,620,089	131.6	213,204	1,595	57.2	91,234	121,970
1971	2,015,024	130.8	263,565	1,628	65.9	107,285	156,270
1972	1,876,011	131.8	247,258	1,655	61.1	101,120	146,138
1973	1,767,425	130.8	231,179	1,683	57.6	96,941	134,238

[a] Not including fats and edible offal.

[b] Consumption figures for Canada.

TABLE B.1 (Continued)

PORK SURPLUS IN ALBERTA, 1961-1973

Sources : Column (1): Canada Department of Agriculture, Livestock Market Review (Ottawa: CDA, various issues).
Column (2): Statistics Canada, Livestock and Animal Products Statistics, Cat.No. 23-203 (Ottawa: Statistics Canada, annual issues).
Column (3): Column (1) multiplied by Column (2).
Column (4): Statistics Canada, Estimated Population of Canada by Province at June 1, Cat.No.91-201 (Ottawa: Statistics Canada, annual issues).
Column (5): Statistics Canada, Estimates of Production and Disappearance of Meats, Cat.No.32-220 (Ottawa: Statistics Canada, annual issues).
Column (6): Column (4) multiplied by Column (5).
Column (7): Column (3) minus Column (6).

TABLE B.2

PORK SURPLUS IN SASKATCHEWAN, 1961-1973

	Graded Hog Carcasses	Average Cold[a] Trimmed Wt.	Total Cold Trimmed Wt.	Population	Per Capita Pork[b] Consumption	Total Consumption	Surplus
	(head)	(lbs)	('000 lbs)	('000)	(lb)	('000 lbs)	('000 lbs)
1961	585,773	128.5	75,272	925	50.3	46,527	28,745
1962	512,855	127.9	65,594	930	50.1	46,593	19,001
1963	369,194	128.7	47,589	933	50.7	47,303	286
1964	508,403	127.8	64,974	942	51.8	48,796	16,178
1965	505,152	126.9	64,104	950	47.9	45,505	18,599
1966	466,360	128.6	59,974	955	46.9	44,789	15,185
1967	598,013	129.0	77,144	957	53.8	51,487	25,657
1968	600,986	128.0	76,926	960	53.6	51,456	25,470
1969	443,618	130.0	57,670	958	51.9	49,720	7,950
1970	868,258	131.6	114,263	941	57.2	53,825	60,438
1971	1,245,622	130.8	162,927	926	65.9	61,023	101,904
1972	1,091,328	131.8	143,837	916	61.1	55,968	87,869
1973	951,381	130.8	124,440	908	57.6	52,301	72,139

[a] Not including fats and edible offal.
[b] Consumption figures for Canada.

Source: Column reference same as Table B.1.

TABLE B.3

PORK SURPLUS IN MANITOBA, 1961-1973

	Hog[a] Slaughterings	Average Cold[b] Trimmed Wt.	Total Cold Trimmed Wt.	Population	Per Capita Pork[c] Consumption	Total Consumption	Surplus
	(head)	(lbs)	('000 lbs)	('000)	(lb)	('000 lbs)	('000 lbs)
1961	756,585	128.5	97,221	922	50.3	46,376	50,844
1962	681,293	127.9	87,137	936	50.1	46,893	40,243
1963	583,119	128.9	75,164	949	50.7	48,114	27,049
1964	748,168	127.8	95,619	959	51.8	49,676	45,942
1965	736,110	126.9	93,412	965	47.9	46,223	47,189
1966	709,009	128.6	91,178	963	46.9	45,165	46,013
1967	894,093	129.0	115,338	963	53.8	51,809	63,528
1968	891,200	128.0	114,074	971	53.6	52,045	62,028
1969	878,594	130.0	114,217	979	51.9	50,810	63,406
1970	1,213,226	131.6	159,660	983	57.2	56,227	103,432
1971	1,555,220	130.8	203,423	988	65.9	65,109	138,313
1972	1,238,971	131.8	163,296	992	61.1	60,611	102,684
1973	1,234,074	130.8	161,418	998	57.6	57,485	103,932

[a] Number of hogs slaughtered in federally inspected and approved packing plants.
[b] Not including fats and edible offal.
[c] Consumption figures for Canada.

Source: Column reference same as Table B.1.

APPENDIX C

IMPORTS AND EXPORTS OF PORK

TABLE C.1

EXPORTS OF DRESSED PORK FROM CANADA TO THE UNITED STATES AND OTHER COUNTRIES, 1960-1973

Annual & Five-Year Averages	To United States[1]		To Other Countries		To All Countries	
	('000 lb)	($'000)	('000 lb)	($'000)	('000 lb)	($'000)
1960	45,098	21,131	24,592	4,181	69,690	25,312
1961	42,428	20,504	15,812	4,333	58,240	24,837
1962	44,318	21,229	15,351	4,382	59,669	25,611
1963	44,452	21,868	19,667	5,146	64,119	27,014
1964	48,353	23,359	6,448	3,091	54,801	26,450
1960-1964	44,930	21,618	16,374	4,227	61,304	25,845
% of Total	(73.3)	(83.6)	(26.7)	(16.4)	(100.0)	(100.0)
1965	53,309	28,757	3,627	2,121	56,936	30,878
1966	44,264	25,445	3,053	2,097	47,317	27,542
1967	53,169	26,422	4,751	2,425	57,920	28,847
1968	54,237	27,010	4,883	2,481	59,120	29,491
1969	48,453	29,013	6,453	4,539	54,906	33,552
1965-1969	50,687	27,329	4,553	2,733	55,240	30,062
% of Total	(91.8)	(90.9)	(8.2)	(9.1)	(100.0)	(100.0)
1970	58,693	30,910	10,269	6,023	68,962	36,933
1971	66,358	27,964	28,842	14,076	95,200	42,040
1972	59,626	31,702	51,603	32,039	111,229	63,741
1973	65,200	45,244	55,192	51,564	120,392	96,808
1970-1973	62,469	33,955	36,477	25,925	98,946	59,880
% of Total	(63.1)	(56.7)	(36.9)	(43.3)	(100.0)	(100.0)

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[1] Includes fresh, frozen, processed, and canned pork.

Source: Statistics Canada, Exports by Commodities, Cat.No. 65-004 (Ottawa: DBS, monthly issues).

TABLE C.2

EXPORTS OF DRESSED PORK FROM CANADA TO THE UNITED STATES 1960-1973

Annual & 5-Year Averages	Fresh & Frozen[a]	Processed[b]	Canned[c]	Total
	.... '000 lbs	....	....	....
1960	35,882	6,031	3,185	45,098
1961	34,080	5,680	2,668	42,428
1962	35,451	6,117	2,750	44,318
1963	33,950	7,465	3,037	44,452
1964	37,085	8,188	3,080	48,353
1960-1964	35,290	6,696	2,944	44,930
% of Total	(78.5)	(14.9)	(6.6)	(100.0)
1965	42,194	8,754	2,361	53,309
1966	37,184	5,721	1,359	44,264
1967	46,482	5,423	1,264	53,169
1968	47,878	5,540	819	54,237
1969	43,069	4,623	761	48,453
1965-1969	43,361	6,012	1,313	50,686
% of Total	(85.5)	(11.9)	(2.6)	(100.0)
1970	53,149	4,558	986	58,693
1971	61,646	3,649	1,063	66,358
1972	55,001	4,250	375	59,626
1973	60,708	3,074	1,418	65,200
1970-1973	57,626	3,883	960	62,469
% of Total	(92.2)	(6.2)	(1.6)	(100.0)

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[a] Includes pork bellies, fresh or frozen; hams, not cured or cooked; pork spareribs, fresh or frozen; and pork, fresh or frozen NES.

[b] Includes bacon, cured; hams, cured; pork, cured NES and boiled ham, cooked.

[c] Includes hams, canned and pork, canned NES.

Source: Statistics Canada, Exports by Commodities, Cat.No. 65-004 (Ottawa: DBS, monthly issues).

TABLE C.3

EXPORTS OF PROCESSED PORK FROM CANADA TO THE UNITED STATES 1960-1973

Year	Cured Hams	Sides & Bacon	Boiled Hams	Pork Cured	Pork[a] Canned	Total
	.... '000 lbs					
1960	1,294	3,299	1,438	-	3,185	9,216
1961	922	3,340	1,098	320	2,668	8,348
1962	1,323	3,555	876	363	2,750	8,867
1963	2,342	3,994	880	249	3,037	10,502
1964	1,576	4,254	2,140	213	3,080	11,268
1965	1,574	4,924	1,998	258	2,361	11,115
1966	959	3,513	1,096	153	1,359	7,080
1967	884	3,499	842	198	1,264	6,687
1968	1,100	3,314	866	260	819	6,359
1969	683	3,075	604	261	761	5,384
1970	686	3,352	260	259	986	5,544
1971	662	2,453	358	176	1,063	4,712
1972	872	2,524	345	509	375	4,625
1973	1,032	1,500	42	500	1,418	4,492

[a] Primarily canned hams.

Source: Statistics Canada, Exports by Commodities, Cat.No. 65-004 (Ottawa: DBS, monthly issues).

TABLE C.4

IMPORTS OF DRESSED PORK[1] FROM THE UNITED STATES AND OTHER COUNTRIES, 1960-1973

Annual & Five-Year Averages	From United States		From Other Countries		From All Countries	
	('000 lb)	($'000)	('000 lb)	($'000)	('000 lb)	($'000)
1960	17,013	4,800	48	26	17,061	4,826
1961	40,630	13,194	23	13	40,653	13,207
1962	36,399	11,170	65	28	36,464	11,198
1963	86,551	25,321	1,936	751	88,487	26,072
1964	52,551	15,070	63	29	52,614	15,099
1960-1964	46,629	13,911	427	169	47,056	14,080
% of Total	(99.1)	(99.9)	(0.9)	(0.01)	(100.0)	(100.0)
1965	27,504	9,687	9,101	3,862	36,605	13,549
1966	27,296	11,498	9,197	4,281	36,493	15,779
1967	26,836	9,987	1,004	405	27,840	10,392
1968	36,428	13,830	8,646	2,932	45,074	16,762
1969	66,901	28,553	8,772	3,167	75,673	31,720
1965-1969	36,993	14,711	7,344	2,929	44,337	17,640
% of Total	(83.4)	(83.4)	(16.6)	(16.6)	(100.0)	(100.0)
1970	22,935	9,253	7,896	2,956	30,831	12,209
1971	13,950	5,024	9,723	3,091	23,673	8,115
1972	33,894	15,675	7,834	2,830	41,728	18,505
1973	42,101	27,818	2,424	2,178	44,525	29,996
1970-1973	28,220	14,442	6,969	2,764	35,189	17,206
% of Total	(80.2)	(83.9)	(19.8)	(16.1)	(100.0)	(100.0)

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[1] Includes fresh, frozen, processed, and canned pork.

Source: Statistics Canada, Imports by Commodities, Cat.No. 65-007 (Ottawa: DBS, monthly issues).

TABLE C.5

CANADA'S IMPORTS AND EXPORTS OF PROCESSED PORK TO AND FROM THE UNITED STATES AND OTHER COUNTRIES, 1960-1973

Year	United States		Other Countries		All Countries		Trade Balance
	Imports[a]	Exports[b]	Imports	Exports	Imports	Exports	
	.... '000 lbs						
1960	5,584	9,216	-	9,347	5,584	18,563	+12,979
1961	11,975	8,348	-	14,863	11,975	23,211	+11,236
1962	12,829	8,867	-	14,521	12,829	23,388	+10,559
1963	11,411	10,502	-	19,045	11,588	29,547	+17,959
1964	10,411	11,268	30	3,703	10,441	14,971	+ 4,530
1965	9,080	11,115	11	2,733	9,091	13,848	+ 4,757
1966	9,005	7,080	91	2,332	9,096	9,412	+ 316
1967	9,479	6,687	350	2,012	9,829	8,699	- 1,130
1968	9,819	6,359	7,490	1,681	17,309	8,040	- 9,269
1969	11,204	5,384	6,430	1,332	17,634	6,716	-10,918
1970	7,966	5,544	5,764	995	13,730	6,539	- 7,191
1971	5,572	4,712	7,771	1,712	13,342	6,424	- 6,919
1972	6,057	4,625	7,328	1,591	13,385	6,216	- 7,169
1973	6,006	4,492	8,055	1,390	14,061	5,882	- 8,178

[a] Includes cured pork NES; cured pork backs, bacon and sides, cured shoulders, picnics and butts, canned hams and luncheon meat.

[b] Includes cured bacon and hams; pork, cured NES; boiled hams, cooked; canned hams and canned pork NES.

Source: Statistics Canada, Imports by Commodities, Cat.No.65-007 (Ottawa: DBS, monthly issues); Statistics Canada, Exports by Commodities, Cat.No.65-004 (Ottawa: DBS, monthly issues).

TABLE C.6

CANADA'S IMPORTS AND EXPORTS OF FRESH AND FROZEN PORK TO AND FROM THE UNITED STATES AND OTHER COUNTRIES, 1960-1973

Year	United States		Other Countries		All Countries		Trade Balance
	Imports[a]	Exports[b]	Imports	Exports	Imports	Exports	
	.... '000 lbs						
1960	11,429	35,882	47	15,245	11,476	51,127	+39,651
1961	28,655	34,080	22	949	28,677	35,029	+ 6,352
1962	23,570	35,451	65	830	23,635	36,281	+12,646
1963	74,963	33,950	1,036	622	76,899	34,572	-42,327
1964	42,140	37,085	33	2,745	42,173	39,830	+ 2,343
1965	18,424	42,194	9,090	894	27,514	43,088	+15,574
1966	18,291	37,184	9,106	721	27,397	37,905	+10,508
1967	17,357	46,482	654	2,739	18,011	49,221	+31,210
1968	26,609	47,878	1,156	3,202	27,765	51,080	+23,315
1969	55,697	43,069	2,342	5,121	58,039	48,190	- 9,849
1970	14,969	53,149	2,132	9,274	17,101	62,423	+45,322
1971	8,378	61,646	1,952	27,130	10,330	88,776	+78,446
1972	27,837	55,001	506	50,012	28,343	105,013	+76,670
1973	35,835	60,708	342	53,802	36,177	114,510	+78,333

[a] Includes pork bellies; hams not cured or cooked; pork, fresh or frozen, NES;; pork shoulders, picnics, butts, fresh or frozen; and pork spareribs.

[b] Includes pork bellies, fresh or frozen; hams, not cured or cooked; pork spareribs, fresh or frozen; and pork, fresh or frozen, NES.

Source: Statistics Canada, Imports by Commodities, Cat.No.65-007 (Ottawa: DBS, monthly issues); Statistics Canada, Exports by Commodities, Cat.No.65-004 (Ottawa: DBS, monthly issues).

TABLE C.7

U.S. IMPORTS AND EXPORTS OF PORK IN RELATION TO DOMESTIC PRODUCTION, 1960-1973

Year	Percent of Production		
	Imports	Exports	Net Imports
1960	1.6	0.7	0.9
1961	1.6	0.6	1.0
1962	1.8	0.6	1.2
1963	1.8	1.1	0.7
1964	2.1	1.1	1.0
1965	3.0	0.5	2.5
1966	3.4	0.5	2.9
1967	3.1	0.5	2.6
1968	3.2	0.7	2.5
1969	3.2	1.2	2.0
1970	3.3	0.5	2.8
1971	3.1	0.5	2.6
1972	3.7	0.8	2.9
1973[a]	4.0	1.3	2.7

[a] Preliminary

Source: United States Department of Agriculture, Livestock and Meat Situation (Washington, D.C.: USDA, ERS, various May issues).

TABLE C.8

PORK IMPORTS: UNITED STATES, BY COUNTRIES, 1960-1973

Year	Imports By Country Of Origin, Product Weight								Total Imports	
	Canada	Denmark	West Germany	Poland	Netherlands	Yugoslavia	Czechoslovakia	All Other	Product Weight	Canned
	million pounds									
1960	47.3	40.7	2.7	35.1	42.0	n.a.	n.a.	3.5	171.3	127
1961	44.7	46.2	1.7	34.7	42.0	1.2	1.1	1.2	172.8	125
1962	46.8	63.8	1.3	39.8	43.4	3.4	1.0	4.3	203.8	158
1963	45.9	71.0	0.9	40.0	42.9	5.5	1.0	3.2	210.5	151
1964	50.6	67.4	1.0	43.9	38.2	7.9	1.0	5.1	215.1	146
1965	57.0	89.6	1.2	52.9	46.2	12.9	1.8	5.7	267.3	178
1966	47.5	122.3	1.8	51.6	65.0	8.7	2.0	5.4	304.3	233
1967	54.8	107.6	1.9	57.2	74.6	12.1	2.6	2.3	313.1	252
1968	55.5	118.5	2.0	55.1	82.2	13.3	2.6	2.4	331.6	268
1969	49.9	116.4	1.8	53.6	85.6	11.8	2.2	3.1	324.4	264
1970	63.2	130.0	2.1	56.0	86.6	11.2	2.5	6.5	358.1	285
1971	69.4	128.1	1.7	54.9	83.5	11.4	1.7	7.8	356.5	288
1972	67.6	151.8	1.1	66.7	75.2	15.0	1.2	16.7	394.7	305
1973[a]	68.3	138.5	1.0	61.3	93.8	19.0	n.a.	16.1	398.0	318

[a] Preliminary

Source: United States Department of Agriculture, Agricultural Statistics (Washington, D.C.: USDA, U.S. Government Printing Offics, various annual issues); USDA, Livestock and Meat Situation (Washington: USDA, ERS, May, 1973).

TABLE C.9

IMPORTS OF PORK INTO THE UNITED STATES, FROM ALL COUNTRIES, 1960-1973

Year	Fresh & Frozen	Sausage	Hams & [1] Shoulders	Bacon[2]	Other[3]	Total Imports	From Canada	
							Imports	Percent of U.S. Import
	....		million pounds		....			... % ...
1960	38.4	1.7	118.5	-	12.7	171.3	45.1	26.3
1961	36.6	1.7	119.4	-	15.2	172.9	42.4	24.5
1962	40.5	1.8	137.0	-	24.6	203.9	44.3	21.7
1963	37.0	1.8	145.3	2.7	23.7	210.5	44.5	21.1
1964	39.2	1.9	142.1	8.9	18.5	210.6	48.4	23.0
1965	48.0	2.0	177.0	12.3	23.0	262.3	53.3	20.3
1966	42.0	2.7	199.8	20.6	33.2	298.3	44.3	14.9
1967	47.4	2.5	212.6	12.7	31.7	306.9	53.2	17.3
1968	48.4	2.5	229.3	12.3	31.6	324.1	54.2	16.7
1969	42.9	3.9	235.0	9.3	24.4	315.5	48.5	15.4
1970	55.6	3.6	253.0	9.7	25.8	347.6	58.7	16.9
1971	62.3	3.7	265.6	8.3	16.6	356.5	66.4	18.6
1972	64.4	5.9	300.0	8.3	16.1	394.7	59.6	15.1
1973	62.4	6.1	308.4	5.7	15.4	397.9	65.2	16.3

[1] Primarily all canned; the balance cured.

[2] Approximately 70 percent canned, the balance cured; up to 1963 reported under hams and shoulders.

[3] Primarily pork luncheon meat, canned.

[4] Primarily fresh and frozen product.

Source: United States Department of Agriculture, Foreign Agriculture Circular: Livestock and Meat (Washington, D.C.: USDA, Foreign Agricultural Services, various issues); Statistics Canada, Exports by Commodities, Cat.No.65-004 (Ottawa: DBS, monthly issues).

APPENDIX D

TRUCK AND RAIL HOG SHIPMENTS INTO CALIFORNIA, 1971-1972

TABLE D.1

TRUCK AND RAIL HOG SHIPMENTS INTO CALIFORNIA, BY MONTHS, 1971 AND 1972

Month	Truck		Rail		Total	
	1971	1972	1971	1972	1971	1972
	....	'000 head	....			
January	11	7	129	103	140	110
February	9	5	98	101	107	106
March	8	7	127	118	135	125
April	6	6	126	111	132	117
May	7	7	112	104	119	111
June	6	5	113	107	119	112
July	6	2	66	97	72	99
August	6	5	106	97	112	102
September	3	8	123	82	126	90
October	4	2	119	107	123	109
November	4	7	116	102	120	109
December	5	5	118	75	123	80
Totals	75	66	1,353	1,204	1,428	1,270

Source: California Department of Food and Agriculture, California Livestock and Poultry Report (Sacremento: Crop and Livestock Reporting Service, 1972).

TABLE D.2

TRUCK AND RAIL HOG SHIPMENTS INTO CALIFORNIA, BY STATES, 1971 AND 1972

State	Truck		Rail		Total	
	1971	1972	1971	1972	1971	1972
	'000 head					
Arizona	*	1	---	---	*	1
Colorado	*	*	---	---	*	*
Idaho	5	8	---	---	5	8
Illinois	*	*	---	---	*	*
Iowa	13	13	143	221	156	234
Kansas	1	*	96	71	97	71
Missouri	*	*	511	432	511	432
Nebraska	40	27	603	479	643	506
Nevada	4	4	---	*	4	4
Oregon	1	*	---	---	1	*
South Dakota	4	1	---	---	4	1
Utah	3	9	---	---	3	9
Misc.	4	3	*	1	1	4
Totals	75	66	1,353	1,204	1,428	1,270

* Less than 500 head.

Source: California Department of Food and Agriculture, California Livestock and Poultry Report (Sacremento: Crop and Livestock Reporting Service, 1972).

APPENDIX E

SUPPORTING DATA,
1973

TABLE E.1

DATA FOR THE ECONOMETRIC MODEL, 1973

Week Ending	Exports of Pork Products (col. 1)	Exports of Pork Bellies (col. 2)	Exports of 11 to 13 lb. Pork Bellies (col. 3)	U.S.-Canadian Farm Price Spread (col. 4)
	(cwt)	(cwt)	(cwt)	($/cwt)
Jan. 6	1,029	632	114.5	-0.01
13	1,710	1,205	628.7	3.93
20	673	42	130.1	3.49
27	1,965	1,203	74.6	2.28
Feb. 3	1,756	567	87.1	0.29
10	1,170	590	39.6	-0.64
17	1,626	216	81.2	2.14
24	1,850	234	101.1	4.04
Mar. 3	1,929	1,084	110.0	3.89
10	1,916	1,024	123.5	2.93
17	3,144	1,235	130.7	2.84
24	2.883	1,228	157.5	2.87
31	4,136	2,874	147.4	0.86
Apr. 7	3,036	816	127.1	5.04
14	2,313	1,326	94.5	2.73
21	1,132	588	111.5	2.85
28	4,858	3,336	397.7	2.29
May 5	2,622	1,105	104.9	2.50
12	4,153	1,463	243.5	3.05
19	4,737	1,673	132.4	5.13
26	3,807	1,216	132.3	6.39
Jun. 2	4,556	1,620	148.4	5.16
9	3,397	1,469	245.8	4.89
16	2,743	960	145.0	5.15
23	4,027	1,188	130.6	4.75
30	1,375	241	119.6	4.81
Jul. 7	3,372	1,102	101.7	5.26
14	2,149	255	111.7	3.06
21	3,013	1,192	110.1	2.01
28	3,081	684	105.6	8.11

TABLE E.1 (Continued)

Date	(col. 1)	(col. 2)	(col. 3)	(col. 4)
Aug. 4	8,076	891	117.1	13.58
11	6,979	553	97.4	10.19
18	4,293	267	80.0	8.92
25	3,226	1,306	81.3	8.05
Sep. 1	4,902	1,742	114.8	7.31
8	2,663	814	139.1	-1.76
15	2,846	1,039	67.7	-0.06
22	2,042	639	87.3	0.34
29	1,476	588	58.0	-3.74
Oct. 6	1,339	192	61.4	-1.54
13	1,390	168	40.0	-0.18
20	740	247	77.9	1.80
27	1,840	219	49.2	1.91
Nov. 3	1,408	610	49.7	-0.77
10	1,476	602	78.8	-2.26
17	1,509	788	72.1	-1.40
24	1,127	266	100.1	0.35
Dec. 1	1,464	236	45.6	-2.13
8	1,243	168	68.7	-3.55
15	1,818	279	62.6	-2.36
22	1,095	243	78.9	2.50
29	1,893	949	296.9	0.61

TABLE E.1 (Continued)

Week Ending	Hog Gradings in Alberta & Saskatchewan (col. 5) ('000 hd)	Slaughter of Hogs in the U.S. (col. 6) ('000 hd)	Slaughter of Hogs in California (col. 7) ('000 hd)	Canada-U.S. Wholesale Price for 11 to 13 lb. Pork Bellies (col. 8) (c/lb)
Jan. 6	40.9	1,155.2	23.0	.03
13	64.9	1,558.5	26.5	.06
20	67.1	1,527.4	28.6	.04
27	64.8	1,554.8	27.0	.08
Feb. 3	58.4	1,342.3	27.3	.10
10	53.6	1,487.6	24.8	.10
17	45.9	1,470.9	25.9	.10
24	61.5	1,371.8	22.2	.06
Mar. 3	59.7	1,524.9	25.6	.03
10	60.2	1,542.3	24.9	.08
17	59.0	1,521.9	24.8	.07
24	57.1	1,595.9	26.3	.07
31	59.0	1,353.8	24.9	.06
Apr. 7	60.3	1,430.5	20.0	.12
14	63.8	1,352.3	23.0	.08
21	50.6	1,441.2	25.5	.02
28	62.8	1,454.2	28.8	.03
May 5	62.5	1,612.0	27.3	.05
12	62.1	1,561.2	28.1	.06
19	58.9	1,412.1	27.4	.06
26	50.0	1,433.1	26.7	.02
Jun. 2	63.1	1,263.4	21.1	.01
9	57.7	1,397.4	26.4	.04
16	59.1	1,377.7	23.6	.10
23	56.1	1,281.8	24.6	.04
30	62.1	1,318.5	25.2	.02
Jul. 7	49.7	1,016.0	20.5	.12
14	61.2	1,155.1	21.5	-.03
21	58.8	1,037.0	14.4	-.03
28	51.5	1,036.3	14.6	.00

TABLE E.1 (Continued)

Date	(col. 5)	(col. 6)	(col. 7)	(col. 8)
Aug. 4	50.3	1,267.0	18.7	.01
11	42.8	1,343.0	18.8	.16
18	47.7	1,214.2	24.1	.38
25	45.1	1,127.4	23.1	.27
Sep. 1	41.3	1,115.9	24.2	.17
8	36.8	1,106.8	20.7	.18
15	49.4	1,303.2	24.5	.12
23	50.0	1,466.7	24.7	.10
30	50.1	1,469.0	25.4	.21
Oct. 6	45.2	1,450.8	26.6	.24
13	40.9	1,528.8	24.5	.21
20	52.4	1,438.6	26.5	.22
27	56.2	1,309.2	31.0	.26
Nov. 3	56.2	1,517.9	24.4	.22
10	50.7	1,519.4	24.8	.16
17	48.0	1,561.5	27.0	.19
24	53.8	1,242.9	19.9	.20
Dec. 1	59.4	1,583.6	25.9	.21
8	54.7	1,575.7	21.4	.20
15	47.3	1,426.3	25.8	.13
22	54.6	1,509.3	25.0	.15
29	16.4	1,088.2	17.8	.13

TABLE E.1 (Continued)

Week Ending	Retail Price of Bacon in San Francisco (col. 9)	Total Pork Stocks in Alta. & Sask. (col. 10)	Pork Belly Stocks in Alta. & Sask. (col. 11)	Pork Belly Stocks 12/down in Alta. & Sask. (col. 12)
	(c/lb)	('000 lbs)	('000 lbs)	('000 lbs)
Jan. 6	111.2	4,083.9	509.1	498.7
13	112.5	4,445.4	499.9	490.2
20	113.1	4,818.0	491.5	483.2
27	113.8	5,184.7	482.8	475.7
Feb. 3	114.3	5,508.0	468.0	462.0
10	114.3	5,986.4	587.2	581.7
17	115.7	6,422.4	692.6	687.5
24	116.8	6,965.3	828.4	823.9
Mar. 3	117.6	7,473.0	958.0	954.0
10	119.0	7,664.6	984.6	981.4
17	119.3	7,854.6	1,011.4	1,009.0
24	120.5	8,036.4	1,036.6	1,035.0
31	121.7	8,224.0	1,062.5	1,062.0
Apr. 7	123.0	8,459.7	930.3	929.8
14	122.7	8,708.8	804.8	804.3
21	121.5	8,906.8	646.3	645.8
28	120.9	9,152.0	521.0	520.0
May 5	120.2	9,039.5	486.1	485.6
12	120.7	8,923.7	250.9	250.4
19	121.9	8,782.0	414.7	414.2
26	122.0	8,551.3	370.5	370.0
Jun. 2	122.3	8,444.0	336.5	336.0
9	122.6	8,225.3	346.2	330.4
16	122.6	8,021.6	357.3	325.5
23	122.8	7,800.5	367.4	320.3
30	122.8	7,603.0	375.0	315.0
Jul. 7	122.8	7,563.9	318.5	267.7
14	122.8	7,556.9	271.7	231.1
21	133.3	7,547.1	223.2	193.2
28	145.3	7,524.0	168.0	150.0
Aug. 4	151.4	7,515.5	202.9	180.3
11	156.2	7,467.3	234.3	207.4
18	159.8	7,446.0	279.1	237.5
25	163.1	7,423.3	300.8	264.9

TABLE E.1 (Continued)

Date	(col. 9)	(col. 10)	(col. 11)	(col. 12)
Sep. 1	165.7	7,397.0	331.0	291.0
8	166.2	7,182.3	287.7	253.6
15	155.8	7,018.8	254.8	225.1
23	153.6	6,859.4	222.6	197.3
30	150.3	6,703.0	191.0	170.0
Oct. 6	149.2	6,873.9	266.6	222.3
13	145.0	7,025.2	335.1	269.7
20	142.1	7,220.6	423.2	330.6
27	140.5	7,433.7	517.1	395.6
Nov. 3	138.5	7,650.0	612.0	461.0
10	138.5	7,727.8	683.3	563.8
17	139.6	7,800.8	748.8	658.9
24	138.3	7,885.7	832.0	776.0
Dec. 1	137.8	7,978.0	919.0	900.0
8	137.6	8,160.7	960.6	939.1
15	136.8	8,317.2	996.2	972.6
22	136.5	8,548.8	1,045.7	1,021.6
29	137.0	8,630.0	1,061.0	1,038.0

Sources: Column (1): Confidential Industry Sources.
Column (2): Same as Column (1).
Column (3): Same as Column (1).
Column (4): Same as Column (1).
Column (5): Canada Department of Agriculture, Canada Livestock and Meat Trade Report (Ottawa: CDA, weekly issues, 1973).
Column (6): United States Department of Agriculture, Livestock, Meat, Wool (Washington, D.C.: USDA, Livestock Div., Agricultural Marketing Service, weekly issues, 1973).
Column (7): Same as Column (6).
Column (8): Same as Column (1).
Column (9): United States Department of Labor, Estimated Retail Food Prices By Cities (Washington, D.C.: U.S. Department of Labor, Bureau of Labor Statistics, 1973).
Column (10): Statistics Canada, Stocks of Frozen Meat Products, Cat.No.32-012 (Ottawa: DBS, 1973).
Column (11): Same as Column (10).
Column (12): Same as Column (10).

TABLE E.2

ZERO-ONE DUMMY VARIABLES

Week Ending	United States Price Freeze (col. 1)	Canadian Rail Strike (col. 2)	Season			
			S_1	S_2	S_3	S_4
Jan. 6	0	0	1	0	0	0
13	0	0	1	0	0	0
20	0	0	1	0	0	0
27	0	0	1	0	0	0
Feb. 3	0	0	1	0	0	0
10	0	0	1	0	0	0
17	0	0	1	0	0	0
24	0	0	1	0	0	0
Mar. 3	0	0	1	0	0	0
10	0	0	1	0	0	0
17	0	0	1	0	0	0
24	0	0	1	0	0	0
31	0	0	1	0	0	0
Apr. 7	0	0	0	1	0	0
14	0	0	0	1	0	0
21	0	0	0	1	0	0
28	0	0	0	1	0	0
May 5	0	0	0	1	0	0
12	0	0	0	1	0	0
19	0	0	0	1	0	0
26	0	0	0	1	0	0
Jun. 2	0	0	0	1	0	0
9	0	0	0	1	0	0
16	1	0	0	1	0	0
23	1	0	0	1	0	0
30	1	0	0	1	0	0
Jul. 7	1	0	0	0	1	0
14	1	0	0	0	1	0
21	1	0	0	0	1	0
28	1	1	0	0	1	0

TABLE E.2 (Continued)

Date	(col. 1)	(col. 2)	S_1	S_2	S_3	S_4
Aug. 4	1	1	0	0	1	0
11	1	1	0	0	1	0
18	1	1	0	0	1	0
25	1	1	0	0	1	0
Sep. 1	1	0	0	0	1	0
8	1	0	0	0	1	0
15	0	0	0	0	1	0
22	0	0	0	0	1	0
29	0	0	0	0	1	0
Oct. 6	0	0	0	0	0	1
13	0	0	0	0	0	1
20	0	0	0	0	0	1
27	0	0	0	0	0	1
Nov. 3	0	0	0	0	0	1
10	0	0	0	0	0	1
17	0	0	0	0	0	1
24	0	0	0	0	0	1
Dec. 1	0	0	0	0	0	1
8	0	0	0	0	0	1
15	0	0	0	0	0	1
22	0	0	0	0	0	1
29	0	0	0	0	0	1

APPENDIX F

MEAT INDUSTRY INTERVIEWS,
June-July, 1973

APPENDIX F

INDIVIDUALS INTERVIEWED, BY CATEGORY, IN THREE REGIONS OF THE PACIFIC NORTHWESTERN STATES, 1973

Category	Region A[1]	Region B[2]	Region C[3]	Total
Packing Plant	1		7	8
Wholesaler	1		2	3
Retailer	1	1	1	3
Processor	14		3	17
Jobber	3	1	1	5
Fabrication Plant	2	2	7	11
Broker	2	2	6	10
Cold Storage	4		1	5
Total	28	6	28	62

[1] Northern California.

[2] Southern California.

[3] Idaho, Oregon, and Washington.

Definitions for firms engaged in slaughtering, processing, and distributing meat products are as follows:

a) Brokers: Act only as representatives of their clients. They do not purchase products, but sell their services for a fee or commission rate to their principals. A few arrange for storage of meat, pending sale or distribution, completing the selling arrangements, and collect from purchasers.

b) Meatpacking: Refers to a combination of wholesale slaughtering and processing operations.

c) Processor: Refers to a nonslaughtering manufacturer of prepared meat items.

d) Wholesaler: A firm engaged in the buying and selling of meat rather than slaughtering or processing. Although most engage in some processing, they are primarily engaged in distributing meat to retailers.

e) Fabricator: A firm who specializes in the preparation of wholesale or retail cuts.

f) Jobber: A firm that specializes more in sales to small retail store outlets.

g) Retailer: A firm or merchant middleman who is engaged primarily in selling to ultimate consumers.

h) Cold Storage: A firm that rents cooler and freezer space. Some firms provide a pick-up and delivery service for their clientele.

These definitions are based on those given in:

"W.F.Williams and T.T.Stout, *Economics of the Livestock-Meat Industry* (New York: The MacMillan Co., 1971); T.[illegible]ckman, W.R.Davidson, and W.W.Talarzyk, *Marketing* (New York: The Ronald Press Co., 1973); R.L.Kohls and W.D.Downey, *Marketing of Agriculture Products* (New York: The MacMillan Co., 1972).

APPENDIX G

TRANSPORTING MEAT INTO CALIFORNIA,

May, 1973

APPENDIX G

SIXTY-FIVE HOURS TO CALIFORNIA

The purpose of this section is to familiarize the reader with the operation of a 'man behind the scene'. Often his role in marketing is assumed to be routine, with little glory or acknowledgement for completing a seller's commitments. I had the opportunity of personally observing the physical distribution of Alberta meat products into California. This then, documents a typical trip that a meat transporter faces when distributing Canadian pork.

Point of Lading

A trucking firm receives shipping requests at their Edmonton office. Once a load is filled--38,000 to 40,000 pounds--a pickup slip is given to a driver.

The driver loads directly from a packing plant shipping dock and/or from public cooler and freezer warehouses. Mixed loads may require stops at more than one plant.

All meat is placed in cardboard boxes lined with brown wrapping paper. Boxes are stamped, indicating weight and contents. A white sticker on a box corner certifies Canadian meat inspection.

Boxes are stacked in cold storage on wooden pallets to ease handling. A forklift places the pallets on rollers in the trailer box, where drivers redistribute them according to transport regulations. The U.S. Transport Commission stipulates that a balanced load per axle is required. Canadian regulations only specify gross weight.

Point of Entry

United States custom officials request to see a driver's pass card before the trailer is parked for border clearance. Three trips are allowed before an authority entrance card is issued.

At Sweetgrass, Montana, load contents are cleared with Morbeley and/or Jensen custom brokers. Their functions are :

1. Complete port of entry form indicating number of load pieces, weight, value, tariff item number, and amount of duty. If the load is mixed, a form is completed for each packer.
2. Pay U.S. duty on imported goods. In the case of meat products, Canadian packing firms reimburse the custom brokers.
3. Post bonds with U.S. customs, hedging their competence. All errors are payable against this bond.

A fee--usually ten to twenty dollars per entry--is charged for this service.

Manifests are inspected and stamped by a U.S. customs officer, and trailer doors are sealed with tin tags (similar to big game tags).

U.S.D.A. Meat Inspection

Truck seals are broken by U.S.D.A. inspectors before the trailer is backed into the inspection dock. The manifests are checked and the number of boxes required for inspection are indicated. Fifteen boxes were inspected from a 40,000 pound shipment of picnics, whereas our mixed load (snouts, ears, tails, short hocks, side bacon, belly skins, and salted sow back bacon) required three to six boxes from each category.

The driver(s) or lumper(s) form a walking aisle in the center of the trailer, exposing all boxes for a U.S.D.A. health inspection stamp of approval.

Boxes that were selected at random from the load are opened and inspected for root hairs, meat bruising and discoloring, and for evidence of pathological disease. Water is poured over the meat cuts, removing frost that may obscure areas. Sliced cryovac bacon is also inspected. Several packages are weighed, with an average weight taken to ensure quality control by Canadian firms.

All boxes are stamped by either drivers or the U.S.D.A. inspector after health specification approval. We stamped our load since three trucks (dock capacity) were being inspected simultaneously.

Like the U.S. custom brokers, U.S.D.A. meat inspection at Great Falls has additional trading costs. These are:

i)	meat cutters	$ 30.00
ii)	lumpers	40.00
iii)	truck docking	35.00
iv)	U.S.D.A. meat inspector	33.18 ($9.48/hr.)
Total		$138.18

This cost is equal to 0.345 cents per pound for a 40,000 pound load.

Transportation Route to California

Trucks loading in Alberta and Saskatchewan cross the border at Coutts-Sweetgrass and proceed to Great Falls, Montana for meat inspection.

The truck route from Great Falls to Oakland, California went as follows: Helena, Whitehall, and Dillon (Montana) to American Falls (Idaho) to Wells, Reno, and Boomtown (Nevada) to Sacremento and Oakland (California).

The drivers stay at the London Lodge in Oakland and park their units on a side street one block from the police station.

Time Documentation

Activity	Hours
Meat loading	11
Edmonton-U.S. border at Coutts	8
Border crossing	1.5
Coutts to Great Falls	2.5
Great Falls meat inspection	3.5
Great Falls to Dillon	6
Dillon to American Falls, Idaho	3.5
American Falls to Boomtown, Nevada	11
Boomtown to Oakland, California	5.5
Oakland deliveries	5
Lay over (meals, fuel, rest)	16.5
Total	65.0 hours

Because this trip took place on a holiday weekend, travel time was extended. Normally, a truck with two drivers would take forty-eight hours and a single driver would take sixty hours.

Back Haul

Perishable fruits and vegetables are regular back haul commodities from California, with an occasional load of Mexican Tequila. Trailers are loaded in approximately 1.5 hours, with Edmonton deliveries 42 hours later.

Summary Comments

The physical handling of meat boxes is excessive. Cardboard boxes containing mixed loads are dirty (walked on) and torn at destination because of a failure to synchronize loading with Californian deliveries. The problem of torn and broken boxes and physical handling of meat products could be minimized with the U.S.D.A. meat inspection being conducted at point of lading. Furthermore, a centralized storage facility where minor cuts from packing plants can be isolated for ease of handling is recommended. Shipments of palletized meat should also be considered to minimize physical handling and to ease distribution of Canadian meat products.

This section would not be complete if I failed to mention the truck drivers who complete scheduled deliveries. The job they do is commendable; one that requires long hours on the road and a genial dedication to both their rig and customer satisfaction. I am indebted to these gentlemen for allowing me the privilege of spending sixty-five hours with them.